

Appendix B

Details of the Radioactive Source Term Sent from ANL-W to the SDA

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Appendix B

Details of the Radioactive Source Term Sent from ANL-W to the SDA

B-1. INTRODUCTION

The radioactive wastes sent from ANL-W to the SDA were collectively grouped into nine different waste streams. These waste streams were identified in Tables 2 and 11 of this report; however, some of this information will be repeated here. Unlike the waste streams defined in the Historical Data Task (HDT) and Recent and Projected Data Task (RPDT) reports (LMITCO 1995a, 1995b), the authors did not select these nine waste streams to identify the buildings or processes that produced these wastes, but rather to group similar types of waste materials within the same categories.

To begin, radioactive wastes generated at ANL-W were usually divided into two periods, depending upon its time of disposal: (1) 1960 through 1983 (the HDT period), or (2) 1984 through 1993 (the RPDT period). These periods were selected to coincide with those identified in the HDT and RPDT reports. Furthermore, ANL-W waste streams identified with a "H" suffix (e.g., ANL-MOD-1H through ANL-MOD-5H) are associated with the "historical" time period, and those identified with a "R" suffix (e.g., ANL-MOD-1R through ANL-MOD-4R) are considered part of the recent time period. However, there were two adjustments made to this identification scheme. In particular, waste stream ANL-MOD-3R was allowed to begin in 1977 (instead of 1984); and waste stream ANL-MOD-2H was extended to cover fuel-bearing wastes through 1988.

Besides its disposal time, all radioactive wastes from ANL-W were grouped into the following subcategories: (1) bulk actinide wastes and special-purpose wastes contained uranium isotopes but only negligible amounts of fission products (e.g., ANL-MOD-4H and ANL-MOD-2R); (2) dissolved fuel and other miscellaneous fuel or fuel-contaminated materials (ANL-MOD-3H), which contained small amounts of fission products and significant quantities of uranium isotopes; (3) fuel-bearing wastes; for example, irradiated and unirradiated fuel specimens that contained actinides and fission products, but generally small amounts of activation products (e.g., waste streams ANL-MOD-2H or ANL-MOD-3R); (4) irradiated subassembly hardware or structural metal wastes that contain large amounts of activation products (e.g., ANL-MOD-1H and ANL-MOD-1R); and finally, (5) general plant and miscellaneous wastes that do not fit into any of the previously defined waste streams. The general plant wastes were grouped into ANL-MOD-5H (1960 through 1983) or ANL-MOD-4R (1984 through 1993), depending upon the time of disposal. The above definitions are not always clearly defined and in some cases arbitrary separations of some waste items were made.

B-2. THE SOURCE TERM CONTAINED WITH THE BULK ACTINIDE WASTES

The bulk actinide wastes sent from ANL-W to the RWMC from 1960 through 1983 are classified in the ANL-MOD-4H waste stream, and those sent to the RWMC from 1984 through 1993 are grouped in the ANL-MOD-2R waste stream. Generally, the bulk actinide wastes consisted of uranium isotopes with smaller amounts of other heavy metals. Fission products and activation products are not expected to be present in this waste stream. The radioactive source term contained within the ANL-MOD-4H waste stream are shown in Table B-1 (best-estimate), Table B-2 (lower-bound) and Table B-3 (upper-bound). Some special wastes (e.g., a radium source) were also grouped in the ANL-MOD-4H waste stream. The radioactive source term contained within the ANL-MOD-2R waste stream are shown in Table B-4 (best-estimate) and Table B-5 (lower-bound and upper-bound). Note that the tables in this appendix are generally sequenced in the following order: The best-estimate inventories are shown first followed by the lower-bound inventories; and then finally, the upper-bound inventories.

The inventory data shown in Table B-1 was determined as follows: First, project personnel reviewed the INEEL records (i.e., RWMIS data, WasteOScope data, and/or Form-110 waste shipment manifests) to determine the reported amounts (i.e., mass or curie inventory) of unirradiated heavy metals^a that were disposed of at the RWMC from ANL-W waste shipments. These records were compiled by Craig Kullberg into spreadsheet files that documented the bulk actinide disposals from 1960 through 1993. In particular, these data included shipments of EBR-1 blanket materials, depleted uranium, uranium oxide, natural uranium, slightly irradiated uranium, plutonium, thorium, and neptunium materials. In addition, a few shipments of radium source material were also identified and included in this waste stream. From all of the collected data, the total amounts of uranium (U-235 and U-238) and thorium were then determined as a function of disposal date. All of the thorium was considered to be Th-232. A small amount of U-234 was estimated to be present along with the other uranium isotopes, although U-234 was never listed in the primary data records. In general, it was assumed that the mass of U-234 present in the bulk waste shipments followed its natural abundance with U-235 (e.g., the natural atomic ratio of U-234 to U-235 is $0.0055\% \div 0.72\% = 7.6\text{E-}3$). Even in the enriched case, this U-234 to U-235 ratio is valid due to the similar atomic weight of the two isotopes. Thus, this ratio was used in all cases. Finally, a small amount of neptunium (12.8 g) was determined to have been disposed in 1981. Based on the INEEL data, the time-dependent inventories shown in Table B-1 were then determined. In the primary dataset, either the mass or activity of each isotope was reported (but usually not both). If the isotope mass data were reported, then this information was converted into an equivalent curie (Ci) inventory using the isotope's specific activity. For instance, if the mass of U-235 was reported in the INEEL records, then the U-235 activity was then determined by dividing the U-235 mass (in grams) by the U-235 specific activity (2.161E-06 Ci/g).

The overall uncertainty in the best-estimate bulk actinide inventories was judged to be a factor of 1.50. This judgment was based on a review of all data examined and the likely uncertainty in reporting practices on the Form 110 shipping manifests. Therefore, to compute the lower-bound bulk actinide inventory for each time-period, the best-estimate numbers were divided by 1.50. In order to compute the upper-bound bulk actinide inventories, the best-estimate numbers were multiplied by 1.50. For example, the 1964 best-estimate U-235 activity sent to the RWMC as a bulk actinide waste in ANL-MOD-4H is shown in Table B-1 as 4.77E-04 Ci (or equivalently 221 g). Consequently, the upper-bound inventory associated with U-238 in waste stream ANL-MOD-4H for 1964 can be calculated as follows:

a. For this waste stream, the heavy metals consisted of unirradiated or slightly irradiated materials that usually contained uranium (e.g., EBR-I blanket rods).

$4.77\text{E-}02 \text{ Ci} \bullet 1.5 = 7.16\text{E-}02 \text{ Ci}$ (as shown in Table B-3). The U-235 lower-bound inventory for 1964 is calculated as $4.77\text{E-}02 \text{ Ci}/1.5 = 3.18\text{E-}02 \text{ Ci}$ (as shown in Table B-2). The upper- and lower-bound inventories for all of the other radionuclides in the ANL-MOD-4H waste stream were similarly calculated, and these data are shown in Tables B-2 and B-3. Note that the uncertainty factor of 1.5 was estimated for the ANL-MOD-4H waste stream only, other waste streams may have different uncertainty factors.

For waste included in the ANL-MOD-4H category, containers were usually wooden boxes, steel drums, and cardboard boxes.

Bulk uranium wastes sent to the RWMC from ANL-W from 1984 through 1993 are shown in Table B-4 (best-estimate) and in Table B-5 (lower-bound and upper-bound). The only waste items included in the ANL-MOD-2R waste stream were uranium isotopes. All of the wastes in this waste stream were shipped to the RWMC in low-grade containers (e.g., low-activity shipments contained in steel drums and wooden boxes).

Table B-1. Best-estimate activities associated with bulk actinide wastes sent from ANL-W to the RWMC (1960 through 1983) (these inventories are included in the ANL-MOD-4H waste stream).

Best-estimate activities (Ci) for ANL-MOD-4H													
Nuclide	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)
H-3	—	—	—	—	—	—	—	—	—	—	—	—	—
Ra-226	—	—	—	—	—	—	—	—	—	—	—	—	—
Th-232	—	—	—	—	—	—	—	1.21E-04	1.21E-04	—	—	—	—
U-234	—	—	—	—	1.04E-02	2.99E-01	—	6.99E-02	4.78E-02	7.87E-02	1.82E-02	5.89E-02	1.25E-02
U-235	—	—	—	—	4.77E-04	1.37E-02	—	3.20E-03	2.19E-03	3.60E-03	8.33E-04	2.70E-03	5.72E-04
U-238	—	—	—	—	1.05E-02	3.00E-01	—	4.84E-02	6.88E-03	2.78E-01	6.32E-02	4.17E-04	4.41E-02
Pu-239	—	—	—	—	—	—	—	1.93E+01	3.23E+01	—	—	—	—
Np-237	—	—	—	—	—	—	—	—	—	—	—	—	—
Total =	—	—	—	—	2.14E-02	6.12E-01	—	1.94E+01	3.24E+01	3.60E-01	8.22E-02	6.20E-02	5.72E-02
Nuclide	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1981 (Ci)	1983 (Ci)	
H-3	—	—	—	—	—	—	1.20E-02	—	1.10E+00	1.90E-01	1.20E+01	1.33E+01	
Ra-226	—	—	3.00E-08	2.00E-01	—	—	—	—	1.00E-06	—	—	2.00E-01	
Th-232	—	—	—	—	—	—	—	—	—	—	—	2.42E-04	
U-234	—	—	—	4.28E-02	8.38E-03	2.53E-02	4.48E-02	2.60E-03	—	1.59E-02	1.32E-02	7.48E-01	
U-235	—	—	—	1.96E-03	3.84E-04	1.16E-03	2.05E-03	1.19E-04	—	7.26E-04	6.03E-04	3.42E-02	
U-238	—	—	—	1.51E-01	2.96E-02	8.92E-02	1.58E-01	9.17E-03	—	5.60E-02	4.65E-02	1.29E+00	
Pu-239	—	—	—	—	—	—	—	—	—	—	—	5.15E+01	
Np-237	—	—	—	—	—	—	—	—	4.37E-03	—	—	4.37E-03	
Total =	—	—	3.00E-08	3.96E-01	3.84E-02	1.16E-01	2.17E-01	1.19E-02	1.10E+00	2.63E-01	1.21E+01	6.71E+01	

File = "NEW Bulk actinides 1960-1983.xls" or NEW2 Best-estimate Totals.xls".

Table B-1 (Part 2). Best-estimate mass inventory associated with bulk actinide wastes sent from ANL-W to the RWMC (1960 through 1983).
 (These inventories are included in the ANL-MOD-4H waste stream).

Best-estimate mass inventory (g) for ANL-MOD-4H													
Nuclide	1960 (g)	1961 (g)	1962 (g)	1963 (g)	1964 (g)	1965 (g)	1966 (g)	1967 (g)	1968 (g)	1969 (g)	1970 (g)	1971 (g)	1972 (g)
H-3	—	—	—	—	—	—	—	—	—	—	—	—	—
Ra-226	—	—	—	—	—	—	—	—	—	—	—	—	—
Th-232	—	—	—	—	—	—	—	1.10E+03	1.10E+03	—	—	—	—
U-234	—	—	—	—	1.67E+00	4.78E+01	—	1.12E+01	7.66E+00	1.26E+01	2.91E+00	9.42E+00	2.00E+00
U-235	—	—	—	—	2.21E+02	6.33E+03	—	1.48E+03	1.01E+03	1.67E+03	3.86E+02	1.25E+03	2.65E+02
U-238	—	—	—	—	3.11E+04	8.92E+05	—	1.44E+05	2.05E+04	8.26E+05	1.88E+05	1.24E+03	1.31E+05
Pu-239	—	—	—	—	—	—	—	3.10E+02	5.19E+02	—	—	—	—
Np-237	—	—	—	—	—	—	—	—	—	—	—	—	—
Total =	—	—	—	—	3.13E+04	8.98E+05	—	1.47E+05	2.31E+04	8.28E+05	1.88E+05	2.50E+03	1.31E+05
Total U =	—	—	—	—	3.14E+04	8.98E+05	—	1.46E+05	2.15E+04	8.28E+05	1.88E+05	2.50E+03	1.31E+05
U234/U235= ^a					7.56E-03	7.56E-03		7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03
Nuclide	1973 (g)	1974 (g)	1975 (g)	1976 (g)	1977 (g)	1978 (g)	1979 (g)	1980 (g)	1981 (g)	1982 (g)	1983 (g)	1983 (g)	
H-3	—	—	—	—	—	—	1.24E-06	—	1.14E-04	1.97E-05	1.24E-03	1.38E-03	
Ra-226	—	—	3.03E-08	2.02E-01	—	—	—	—	1.01E-06	—	—	2.02E-01	
Th-232	—	—	—	—	—	—	—	—	—	—	—	2.21E+03	
U-234	—	—	—	6.85E+00	1.34E+00	4.05E+00	7.17E+00	4.16E-01	—	2.54E+00	2.11E+00	1.20E+02	
U-235	—	—	—	9.06E+02	1.78E+02	5.35E+02	9.49E+02	5.50E+01	—	3.36E+02	2.79E+02	1.58E+04	
U-238	—	—	—	4.49E+05	8.80E+04	2.65E+05	4.70E+05	2.73E+04	—	1.67E+05	1.38E+05	3.84E+06	
Pu-239	—	—	—	—	—	—	—	—	—	—	—	8.29E+02	
Np-237	—	—	—	—	—	—	—	—	6.2E+00	—	—	6.2E+00	
Total =	—	—	3.03E-08	4.50E+05	8.82E+04	2.66E+05	4.71E+05	2.73E+04	6.2E+00	1.67E+05	1.38E+05	3.86E+06	
Total U =	—	—	—	4.50E+05	8.82E+04	2.66E+05	4.71E+05	2.73E+04	—	1.67E+05	1.39E+05	3.85E+06	
U234/U235= ^a				7.56E-03	7.56E-03	7.56E-03	7.56E-03	7.56E-03		7.56E-03	7.56E-03	7.56E-03	

a. Ratios were computed in spreadsheets using more than three significant digits of accuracy. These numbers may differ slightly with calculations made with table values that are shown to only three significant digits.

Table B-2. Lower-bound activity inventory associated with bulk actinide wastes sent to the RWMC from ANL-W (1960 through 1983) (these inventories are included in the ANL-MOD-4H waste stream).

Nuclide	Lower-bound activities (Ci) for ANL-MOD-4H												
	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)
H-3	—	—	—	—	—	—	—	—	—	—	—	—	—
Ra-226	—	—	—	—	—	—	—	—	—	—	—	—	—
Th-232	—	—	—	—	—	—	—	8.07E-05	8.07E-05	—	—	—	—
U-234	—	—	—	—	6.95E-03	1.99E-01	—	5.53E-02	4.08E-02	5.25E-02	1.21E-02	3.93E-02	8.33E-03
U-235	—	—	—	—	3.18E-04	9.12E-03	—	2.13E-03	1.46E-03	2.40E-03	5.56E-04	1.80E-03	3.81E-04
U-238	—	—	—	—	6.98E-03	2.00E-01	—	3.23E-02	4.59E-03	1.85E-01	4.21E-02	2.78E-04	2.94E-02
Pu-239	—	—	—	—	—	—	—	1.28E+01	2.15E+01	—	—	—	—
Np-237	—	—	—	—	—	—	—	—	—	—	—	—	—
Total =	—	—	—	—	1.42E-02	4.08E-01	—	1.29E+01	2.16E+01	2.40E-01	5.48E-02	4.13E-02	3.81E-02
Nuclide	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1960–1983 (Ci)	
	—	—	—	—	—	—	8.00E-03	—	7.33E-01	1.27E-01	8.00E+00	8.87E+00	
H-3	—	—	—	—	—	—	8.00E-03	—	7.33E-01	1.27E-01	8.00E+00	8.87E+00	
Ra-226	—	—	2.00E-08	1.33E-01	—	—	—	—	6.67E-07	—	—	1.33E-01	
Th-232	—	—	—	—	—	—	—	—	—	—	—	1.61E-04	
U-234	—	—	—	2.85E-02	5.59E-03	1.69E-02	2.99E-02	1.73E-03	—	1.06E-02	8.78E-03	4.99E-01	
U-235	—	—	—	1.31E-03	2.56E-04	7.71E-04	1.37E-03	7.93E-05	—	4.84E-04	4.02E-04	2.28E-02	
U-238	—	—	—	1.01E-01	1.97E-02	5.95E-02	1.05E-01	6.11E-03	—	3.73E-02	3.10E-02	8.60E-01	
Pu-239	—	—	—	—	—	—	—	—	—	—	—	3.44E+01	
Np-237	—	—	—	—	—	—	—	—	6.00E-03	—	—	6.00E-03	
Total =	—	—	2.00E-08	2.64E-01	2.56E-02	7.71E-02	1.45E-01	7.92E-03	7.39E-01	1.75E-01	8.04E+00	4.48E+01	

File = "NEW Bulk actinides 1960–1983.xls" or "NEW2 Lower-bound Totals.xls".

Table B-3. Upper-bound activity inventory associated with bulk actinide wastes sent to the RWMC from ANL-W (1960 through 1983) (these inventories are included in the ANL-MOD-4H waste stream).

Upper-bound activities (Ci) for ANL-MOD-4H													
Nuclide	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)
H-3	—	—	—	—	—	—	—	—	—	—	—	—	—
Ra-226	—	—	—	—	—	—	—	—	—	—	—	—	—
Th-232	—	—	—	—	—	—	—	1.82E-04	1.82E-04	—	—	—	—
U-234	—	—	—	—	1.56E-02	4.48E-01	—	1.24E-01	9.17E-02	1.18E-01	2.73E-02	8.83E-02	1.87E-02
U-235	—	—	—	—	7.16E-04	2.05E-02	—	4.80E-03	3.28E-03	5.40E-03	1.25E-03	4.04E-03	8.58E-04
U-238	—	—	—	—	1.57E-02	4.50E-01	—	7.27E-02	1.03E-02	4.17E-01	9.48E-02	6.25E-04	6.62E-02
Pu-239	—	—	—	—	—	—	—	2.89E+01	4.84E+01	—	—	—	—
Np-237	—	—	—	—	—	—	—	—	—	—	—	—	—
Total =	—	—	—	—	3.21E-02	9.18E-01	—	2.91E+01	4.85E+01	5.40E-01	1.23E-01	9.30E-2	8.58E-02
Nuclide	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1960–1983 (Ci)	
H-3	—	—	—	—	—	—	1.80E-02	—	1.65E+00	2.85E-01	1.80E+01	2.00E+01	
Ra-226	—	—	4.50E-08	3.00E-01	—	—	—	—	1.50E-06	—	—	3.00E-01	
Th-232	—	—	—	—	—	—	—	—	—	—	—	3.63E-04	
U-234	—	—	—	6.42E-02	1.26E-02	3.79E-02	6.72E-02	3.90E-03	—	2.38E-02	1.98E-02	1.12E+00	
U-235	—	—	—	2.94E-03	5.76E-04	1.74E-03	3.08E-03	1.78E-04	—	1.09E-03	9.04E-04	5.14E-02	
U-238	—	—	—	2.26E-01	4.44E-02	1.34E-01	2.37E-01	1.38E-02	—	8.40E-02	6.97E-02	1.94E+00	
Pu-239	—	—	—	—	—	—	—	—	—	—	—	7.73E+01	
Np-237	—	—	—	—	—	—	—	—	1.35E-02	—	—	1.35E-02	
Total =	—	—	4.50E-08	5.94E-01	5.75E-02	1.74E-01	3.25E-01	1.78E-02	1.66E+00	3.94E-01	1.81E+01	1.01E+02	

File = "NEW Bulk actinides 1960–1983.xls" or "NEW2 Upper-bound Totals.xls".

Table B-4. Best-estimate inventories associated with bulk actinide wastes sent to the RWMC from ANL-W (1984 through 1993) (these inventories are included in the ANL-MOD-2R waste stream).

Best Estimate activities for bulk actinide disposals made to the Pits in low-grade containers											
Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)	Total (Ci)
U-234	4.28E-02	9.33E-03	6.53E-02	2.79E-01	3.89E-01	1.15E-01	1.58E-02	5.79E-03	1.84E-02	3.07E-02	9.71E-01
U-235	1.94E-03	4.23E-04	2.96E-03	1.26E-02	1.76E-02	5.20E-03	7.14E-04	2.62E-04	8.34E-04	1.39E-03	4.40E-02
U-238	3.48E-02	1.10E-04	4.18E-03	3.20E-02	6.03E-03	3.20E-03	5.31E-05	1.17E-04	3.81E-03	7.36E-05	8.44E-02
Total =	7.95E-02	9.86E-03	7.24E-02	3.24E-01	4.13E-01	1.23E-01	1.66E-02	6.17E-03	2.30E-02	3.22E-02	1.10E+00
Best Estimate mass inventory for bulk actinide disposals made to the Pits in low-grade containers											
Nuclide	1984 (g)	1985 (g)	1986 (g)	1987 (g)	1988 (g)	1989 (g)	1990 (g)	1991 (g)	1992 (g)	1993 (g)	Total (g)
U-234	6.85E+00	1.49E+00	1.04E+01	4.46E+01	6.23E+01	1.84E+01	2.52E+00	9.27E-01	2.95E+00	4.92E+00	1.55E+02
U-235	8.97E+02	1.96E+02	1.37E+03	5.84E+03	8.16E+03	2.41E+03	3.31E+02	1.21E+02	3.86E+02	6.44E+02	2.03E+04
U-238	1.04E+05	3.26E+02	1.24E+04	9.52E+04	1.79E+04	9.53E+03	1.58E+02	3.48E+02	1.13E+04	2.19E+02	2.51E+05
Total =	1.05E+05	5.23E+02	1.38E+04	1.01E+05	2.61E+04	1.20E+04	4.92E+02	4.70E+02	1.17E+04	8.68E+02	2.71E+05
U234/U235=	7.64E-03										

File = "NEW Bulk actinides 1984-1993.xls"

Table B-5. Lower-bound and Upper-bound activities associated with bulk actinide wastes sent to the RWMC from ANL-W (1984 through 1993) (these inventories are included in the ANL-MOD-2R waste stream).

Lower-bound activities for bulk actinide disposals made to the Pits in low-grade containers											
Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)	Total (Ci)
U-234	2.85E-02	6.22E-03	4.35E-02	1.86E-01	2.60E-01	7.66E-02	1.05E-02	3.86E-03	1.23E-02	2.05E-02	6.47E-01
U-235	1.29E-03	2.82E-04	1.97E-03	8.41E-03	1.18E-02	3.47E-03	4.76E-04	1.75E-04	5.56E-04	9.27E-04	2.93E-02
U-238	2.32E-02	7.32E-05	2.79E-03	2.13E-02	4.02E-03	2.14E-03	3.54E-05	7.79E-05	2.54E-03	4.91E-05	5.63E-02
Total =	5.30E-02	6.57E-03	4.83E-02	2.15E-01	2.75E-01	8.22E-02	1.10E-02	4.12E-03	1.54E-02	2.15E-02	7.33E-01
Upper-bound activities for bulk actinide disposals made to the Pits in low-grade containers (1984–1993)											
Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)	Total (Ci)
U-234	6.42E-02	1.40E-02	9.79E-02	4.18E-01	5.84E-01	1.72E-01	2.37E-02	8.69E-03	2.76E-02	4.61E-02	1.46E+00
U-235	2.91E-03	6.34E-04	4.43E-03	1.89E-02	2.64E-02	7.80E-03	1.07E-03	3.94E-04	1.25E-03	2.09E-03	6.60E-02
U-238	5.23E-02	1.65E-04	6.27E-03	4.80E-02	9.05E-03	4.81E-03	7.96E-05	1.75E-04	5.71E-03	1.10E-04	1.27E-01
Total =	1.19E-01	1.48E-02	1.09E-01	4.85E-01	6.19E-01	1.85E-01	2.48E-02	9.26E-03	3.46E-02	4.83E-02	1.65E+00

File = "NEW Bulk actinides 1960–1983.xls"

B-3. WASTES FROM IRRADIATED FUEL SENT FROM ANL-W TO THE RWMC

Fuel-bearing wastes were divided into three major waste streams: (1) ANL-MOD-3H, which included radioactive wastes shipped from ANL-W to the RWMC from 1960 through 1970; (2) ANL-MOD-2H, which included fuel-bearing wastes from 1971 through 1983; and (3) ANL-MOD-3R which contained fission and actinide wastes sent to the RWMC from 1984 through 1993. All the radioactive materials in these wastes streams were produced from either unirradiated or irradiated fuel, dissolved fuel, miscellaneous fuel specimens, and other fuel-contaminated hardware. Most of the radioactive items in these waste streams consisted of small amounts of heavy metals (e.g., uranium), small inventories of fission product isotopes (e.g., Cs-137), and small concentrations of activation products (e.g., Co-60). As previously discussed, the primary source of information for these data were INEEL records (i.e., RWMIS electronic data, WasteOScope electronic data, and/or paper copies of Form 110 waste shipment manifests). These records were compiled into spreadsheet files and were analyzed by Craig Kullberg. In any case, many important radioisotopes were not reported in these records and had to be determined using alternate techniques. For instance, if irradiated fuel was present in a waste stream, then fission products were assumed to also be present. Since detailed information on the fission product inventory contained with the irradiated fuel was usually not reported, the inventory of each radionuclide that should be present in these waste materials was determined by multiplying the kg mass of disposed fuel by an average scaling factor (Ci/kg). The scaling factors for EBR-II fuel are shown in Tables B-6 and B-7. The Table B-6 data represents curies of the radionuclide divided by the kg mass of heavy-metals (HM) that were initially present in the fuel specimen. In Table B-7, the scaling factors are computed based on the Cs-137 inventory. Therefore, the information in Tables B-6 and B-7 represents the same data but in different forms. For example, the best-estimate scaling factor for I-129 is shown in Table B-7 as 2.52E-07 Ci/Ci-Cs-137. This number can be determined from the data in Table B-6 as follows: $2.52\text{E-}07 = (6.20\text{E-}05 \text{ Ci-I-}129/\text{kg-HM}) / (2.46\text{E+}02 \text{ Ci-Cs-}137 \text{ kg-HM})$.

The scaling factors shown in Tables B-6 and B-7 were determined from four different reactor physics calculations performed on EBR-II Mark-II and/or Mark-III fuel pins. The first reactor physics calculation was performed by Kermit Bunde at ANL-W (these results are documented in Bunde [August 27, 1997]). Bunde's calculations involved both Mark-II and Mark-III subassembly hardware without fuel; however, only the data on Mark-II fuel elements are of interest here since most of the structural components that were disposed of at the RWMC were Mark-II elements. Although Bunde did not calculate a Cl-36 inventory for activated metal, it was possible to extend his analysis to include Cl-36. Scaling factors were then determined based on Bunde's reported inventory data, and these results are shown in Column 2 of Table B-8.

The second set of inventory calculations were performed by Richard D. McKnight at ANL-E. McKnight's results are documented in the two references authored by P. Kuan. The inventory data for fuel pin DP21 was based on a burnup of 10 atom-%. Before scaling factors were calculated, the DP21 data were linearly reduced to 8 atom-%, which more closely represented a typical burnup scenario for a Mark-II subassembly. In addition to fuel, some stainless steel structural material in the form of cladding was included in this calculation. Therefore, the calculated inventory numbers include fission products, actinides, and activation products. Scaling factors were then determined by dividing the reported curie inventories by the heavy metal mass of uranium that was initially in the fuel. These results are shown in Column 3 of Table B-8.

A third set of EBR-II fuel calculations are reported by J. Liaw and these data involved a mixture of EBR-II fuel types (burned to 8 atom-%) and were then normalized to a 1.0 kg HM basis, and subsequently decay corrected to the year 2000. The main problem with the inventory data reported by

Liaw is the fact that these results were decayed to the year 2000, and were not reported for a time closer to when the fuel elements were removed from the reactor. In any case, the decay correction is not important for the long-lived radionuclides. Consequently, the best-estimate scaling factors for the short-lived radionuclides were determined from data sources other than Liaw's data. Finally, the Liaw data was converted into scaling factors, and these results are shown in Column 4 of Table B-8. A fourth set of scaling factors was documented in the ANL-W Final Environmental Impact Statement (DOE/EIS-0306 Vol. 2). These numbers are shown in Column 5 of Table B-8.

The fifth and last set of EBR-II fuel calculations were performed by M. Carboneau. These calculations were performed with the ORIGEN2 code (Croft 1980), a model of an EBR-II Mark-II subassembly (including stainless steel hardware and fuel), a fast flux cross-section library, and a maximum burnup scenario of 9.1 atom-% U235 burnup (or 5.4 atom-% total U burnup). In addition to fuel, stainless steel structural material was included in this model. Also, these results were computed near the time that the subassembly was removed from the reactor. The ORIGEN2 inventory data were converted into a set of scaling factors, which are shown in Column 6 of Table B-8.

In another example, if the fission product Cs-137 was known to be present in a particular waste shipment, then other fission products were also assumed to be present based on a scaling factor analysis computed relative to Cs-137. These scaling factors are shown in Table B-7. In particular, the Table B-7 data were computed from the information shown in Table B-6. For example, to compute the best-estimate I-129/Cs-137 scaling factor, the ratio of the best-estimate I-129/HM (6.20E-05) and best-estimate Cs-137/HM (2.46E+02) values from Table B-6 were considered. Consequently, $I-129/Cs-137 = 6.20E-05 / 2.46E+02 = 2.52E-07$.

Unlike the analysis performed for the bulk actinide wastes, there was no simple mathematical procedure for estimating the upper-bound and lower-bound inventories based on one global uncertainty number. That is, a single uncertainty factor of 1.50 could not be applied to all radionuclides. Instead, separate uncertainty factors were estimated for each radionuclide based on its scaling factor. These uncertainty factors are shown in Tables B-6 and B-7.

It was decided early on that the most reliable fission product information contained in the INEEL data records was probably Cs-137. Cs-137 is a radioisotope that emits a energetic gamma-ray (0.662 MeV) during its decay process. This gamma-ray is important to shield against during the transportation and disposal activities surrounding this wastes. Although the curie inventory of some other isotopes were occasionally reported on the shipping manifests, most radioisotopes (that should have been present along with Cs-137) were generally not reported. It should be remembered that the main purpose of reporting the radionuclide information on the shipping manifests were to inform personnel working with these waste of potential radiation hazards and to limit the radiation exposures to persons working near these wastes during the transportation and disposal activities. At the time these wastes were disposed of at the RWMC, a total waste characterization was not a concern. Consequently, to estimate the activity of radionuclides that should be present along with these wastes, some type of scaling analysis had to be performed. For instance, it is believed that the Cs-137 data reported in the INEEL records are probably the most reliable radionuclide data available; however, other fission products that should also be present with Cs-137 were generally not reported. These radionuclides have to be estimated based on the reported Cs-137 activity and a scaling factor number. The scaling factors were determined based on at reactor physics calculations for EBR-II fuel.

Nearly all radioactive wastes generated at ANL-W were produced from activated hardware, which includes irradiated fuel elements from EBR-II. Small amounts of other wastes were generated in other facilities located at ANL-W; however, the majority of wastes sent to the RWMC from ANL-W were produced as a direct result of the EBR-II reactor and subsequent work conducted at ANL-W hot cells on

EBR-II fuel. As fuel and structural hardware was irradiated in EBR-II, fission products would be produced in the fuel, activation products were generated in the stainless steel hardware and cladding, and actinides were generated within the EBR-II metallic fuel. When these fuel elements were disassembled in the ANL-W hot cells, pieces of activated metal and fuel would be produced. These radioactive items, by themselves, could end up in a waste stream or they could contaminate nonirradiated equipment, making this new mixture radioactive. The radioactive equipment would then find its way into a waste stream and was eventually buried at the RWMC. In any case, the main source of all radioactive waste from ANL-W was irradiated subassemblies coming from EBR-II.

The following table data are organized for each waste stream as follows: best-estimate (first), lower-bound (second), and then upper-bound (third). Some tables appear on multiple pages due to the number of radionuclides that are listed and the number of years of data.

The best-estimate scaling factors were determined from four sets scaling factors shown in Table B-8. The best-estimate scaling factors were not computed as a simple average of the listed data. This was not be done since some computer models did not model the buildup of all radionuclides. For example, most of the Cl-36 that is produced within irradiated stainless steel is generated as a result of a n-gamma reaction with the initial impurity atom: Cl-35. However, many of the computer models did not model an initial concentration of Cl-35 in stainless steel. Therefore, the best-estimate scaling factor for Cl-36 was based on the ORIGEN2 calculations performed by Carboneau. This situation also happens with C-14, which is produced as a result of a n-p reaction with N-14. Therefore, the best-estimate scaling factors were selected as one of the four listed values, with the specific selection being made based on known limitations of the computer models and/or agreement between the various results; and were not based on a simple average of the listed data.

In summary, the scaling factors that are based on K. Bunde's data best represent intact Mark-II EBR-II subassemblies (with the fueled regions removed). McKnight's data (documented by P. Kuan) best represents the fueled region of a Mark-III subassemblies with most of the subassembly hardware removed (i.e., with only the stainless steel cladding). In addition, J. Liaw's data represents a mixture of EBR-II elements all decayed to the year 2000. Therefore, Liaw's data can only be used to derive scaling factors when long-lived radionuclides are being considered. Scaling factors based on K. Bunde's data are best used for subassembly hardware wastes included in waste streams ANL-MOD-1H and ANL-MOD-1R. The other data (e.g., P. Kuan, J. Liaw, and M. Carboneau) were used to determine a best-estimate set of scaling factors that were used to determine radionuclide inventories associated with general plant wastes (ANL-MOD-5H and ANL-MOD-4R), fission product and actinide wastes (ANL-MOD-3R), and fuel-bearing waste streams (ANL-MOD-2H, ANL-MOD-3H).

In a general sense, the uncertainty factors associated with each scaling factor are affected by several things: (1) accuracy of the computer models (e.g., the average variation in the listed scaling factors shown in Table B-8), (2) the variability in the precursor concentration in the original material (which is not shown), (3) decay time while the material is being stored before shipment to the RWMC, (4) irradiation history, and (5) neutron fluence. Without detailed information on each subassembly that was irradiated in the EBR-II core, it is not realistic to determine a statistical estimate for the uncertainty factors. In stead, in most cases, engineering judgment was the principal method for estimating these numbers. For example, the precursor isotope for Co-60 is Co-59; and the variability in Co-59 in EBR-II stainless steels alloys (304 and 316) is about a factor of 3. The average variability (relative to the selected best-estimate scaling factor for Co-60) for the scaling factors shown for Co-60 in Table B-8 is about a factor 11; however, the estimated uncertainty in the Co-60 inventory, as shown in Tables B-7 or B-8 is a factor of 10; and this value was based on engineering judgment.

Since detailed precursor information or detailed computer model information was not known for most calculations, engineering judgment was the primary method for estimating the uncertainty factor associated with each scaling factor. The uncertainty factors associated with each scaling factor are shown in Column 4 of Tables B-6 and B-7.

Multiplying the estimated scaling factors from Table B-6 (either best-estimate factors for a best-estimate inventory, minimum factors for a lower-bound inventory, or maximum factors for a upper-bound inventory) by the kg mass of HMs that were disposed of at the RWMC from waste shipments from ANL-W, the estimated inventories of radionuclides included in these waste shipments can be calculated for waste streams ANL-MOD-3H and ANL-MOD-2H. These results are shown in Tables B-9 through B-14 (based on Tables A-1 to A-11).

Waste containers were generally unknown for waste shipments made within waste streams: ANL-MOD-3H and ANL-MOD-2H; however, it is believed that high-activity shipments were probably made in a high-integrity insert (e.g., a stainless steel container). For low-activity shipments, the shipping container varied; however, typical containers were probably wooden boxes and carbon steel drums.

Table B-6. Scaling factors per kg of heavy metal and the corresponding uncertainty factors for several important radionuclides.

Nuclide	Radionuclide half-life (yr)	Best-estimate Scaling Factor Ci/kg-HM	Estimated Uncertainty Factor	Minimum Scaling Factor Ci/kg-HM	Maximum Scaling Factor Ci/kg-HM
H-3	1.23E+01	1.21E+00	5	2.41E-01	6.03E+00
C-14	5.73E+03	8.21E-04	5	1.64E-04	4.10E-03
Cl-36	3.01E+05	1.01E-06	100	1.01E-08	1.01E-04
Co-60	5.27E+00	4.71E+00	10	4.71E-01	4.71E+01
Ni-59	7.60E+04	2.46E-03	10	2.46E-04	2.46E-02
Ni-63	1.00E+02	9.50E-02	2	4.75E-02	1.90E-01
Sr-90	2.88E+01	1.78E+02	2	8.89E+01	3.55E+02
Nb-94	2.03E+04	1.36E-04	3	4.52E-05	4.07E-04
Tc-99	2.11E+05	3.01E-02	2	1.50E-02	6.01E-02
I-129	1.57E+07	6.20E-05	2	3.10E-05	1.24E-04
Cs-137	3.01E+01	2.46E+02	2	1.23E+02	4.92E+02
Eu-152	1.35E+01	1.25E-02	5	2.50E-03	6.24E-02
Eu-154	8.59E+00	1.30E+00	5	2.61E-01	6.51E+00
Pb-210	2.23E+01	2.83E-10	10	2.83E-11	2.83E-09
Ra-226	1.60E+03	2.64E-09	5	5.28E-10	1.32E-08
Ra-228	5.75E+00	2.97E-13	20	1.49E-14	5.95E-12
Ac-227	2.18E+01	8.72E-08	20	4.36E-09	1.74E-06
Th-228	1.91E+00	2.57E-05	50	5.13E-07	1.28E-03
Th-229	7.30E+03	3.08E-09	3	1.03E-09	9.23E-09
Th-230	7.54E+04	1.21E-06	2	6.06E-07	2.43E-06
Th-232	1.40E+10	6.38E-06	5	1.28E-06	3.19E-05
Pa-231	3.28E+04	4.10E-07	5	8.19E-08	2.05E-06
U-232	6.89E+01	2.81E-05	2	1.40E-05	5.61E-05
U-233	1.59E+05	2.27E-06	2	1.14E-06	4.55E-06
U-234	2.46E+05	1.48E-02	2	7.42E-03	2.97E-02
U-235	7.04E+08	6.05E-04	1.1	5.50E-04	6.66E-04
U-236	2.34E+07	9.56E-04	2	4.78E-04	1.91E-03
U-238	4.47E+09	1.16E-04	2	5.81E-05	2.32E-04
Np-237	2.14E+06	1.98E-04	2	9.89E-05	3.96E-04
Pu-238	8.77E+01	1.02E-01	3	3.40E-02	3.06E-01
Pu-239	2.41E+04	4.07E+00	2	2.04E+00	8.14E+00
Pu-240	6.56E+03	6.23E-02	10	6.23E-03	6.23E-01
Pu-241	1.44E+01	1.07E+00	50	2.14E-02	5.36E+01
Pu-242	3.73E+05	1.71E-05	10	1.71E-06	1.71E-04
Pu-244	8.08E+07	1.13E-14	10	1.13E-15	1.13E-13
Am-241	4.32E+02	2.69E-02	10	2.69E-03	2.69E-01
Am-243	7.37E+03	1.45E-05	50	2.90E-07	7.26E-04
Cm-243	2.91E+01	4.14E-06	50	8.27E-08	2.07E-04
Cm-244	1.81E+01	1.31E-04	100	1.31E-06	1.31E-02
Cm-245	8.50E+03	6.44E-09	50	1.29E-10	3.22E-07
Cm-246	4.76E+03	6.02E-11	50	1.20E-12	3.01E-09
Cm-247	1.56E+07	5.42E-17	20	2.71E-18	1.08E-15
Cm-248	3.48E+05	1.01E-17	10	1.01E-18	1.01E-16

Table B-7. Scaling factors relative to Cs-137 and the corresponding uncertainty factors for several important radionuclides.

Nuclide	Radionuclide half-life (yr)	Best-estimate Scaling Factor Ci/Ci-Cs-137	Estimated Uncertainty Factor	Minimum Scaling Factor Ci/Ci-Cs-137	Maximum Scaling Factor Ci/Ci-Cs-137
H-3	1.23E+01	4.92E-03	5	9.84E-04	2.46E-02
C-14	5.73E+03	3.34E-06	5	6.68E-07	1.67E-05
Cl-36	3.01E+05	4.12E-09	100	4.12E-11	4.12E-07
Co-60	5.27E+00	1.91E-02	10	1.91E-03	1.91E-01
Ni-59	7.60E+04	1.00E-05	10	1.00E-06	1.00E-04
Ni-63	1.00E+02	3.86E-04	2	1.93E-04	7.73E-04
Sr-90	2.88E+01	7.23E-01	2	3.61E-01	1.45E+00
Nb-94	2.03E+04	5.51E-07	3	1.84E-07	1.65E-06
Tc-99	2.11E+05	1.22E-04	2	6.11E-05	2.45E-04
I-129	1.57E+07	2.52E-07	2	1.26E-07	5.05E-07
Cs-137	3.01E+01	1.00E+00	2	5.00E-01	2.00E+00
Eu-152	1.35E+01	5.08E-05	5	1.02E-05	2.54E-04
Eu-154	8.59E+00	5.30E-03	5	1.06E-03	2.65E-02
Pb-210	2.23E+01	1.15E-12	10	1.15E-13	1.15E-11
Ra-226	1.60E+03	1.07E-11	20	5.37E-13	2.15E-10
Ra-228	5.75E+00	1.21E-15	100	1.21E-17	1.21E-13
Ac-227	2.18E+01	3.55E-10	20	1.77E-11	7.10E-09
Th-228	1.91E+00	1.04E-07	50	2.09E-09	5.22E-06
Th-229	7.30E+03	1.25E-11	3	4.17E-12	3.76E-11
Th-230	7.54E+04	4.93E-09	2	2.47E-09	9.87E-09
Th-232	1.40E+10	2.60E-08	5	5.19E-09	1.30E-07
Pa-231	3.28E+04	1.67E-09	5	3.33E-10	8.33E-09
U-232	6.89E+01	1.14E-07	2	5.71E-08	2.28E-07
U-233	1.59E+05	9.25E-09	2	4.63E-09	1.85E-08
U-234	2.46E+05	6.04E-05	2	3.02E-05	1.21E-04
U-235	7.04E+08	2.46E-06	1.1	2.24E-06	2.71E-06
U-236	2.34E+07	3.89E-06	2	1.94E-06	7.77E-06
U-238	4.47E+09	4.73E-07	2	2.36E-07	9.46E-07
Np-237	2.14E+06	8.04E-07	2	4.02E-07	1.61E-06
Pu-238	8.77E+01	4.15E-04	3	1.38E-04	1.25E-03
Pu-239	2.41E+04	1.66E-02	2	8.28E-03	3.31E-02
Pu-240	6.56E+03	2.54E-04	10	2.54E-05	2.54E-03
Pu-241	1.44E+01	4.36E-03	50	8.72E-05	2.18E-01
Pu-242	3.73E+05	6.97E-08	10	6.97E-09	6.97E-07
Pu-244	8.08E+07	4.61E-17	10	4.61E-18	4.61E-16
Am-241	4.32E+02	1.09E-04	10	1.09E-05	1.09E-03
Am-243	7.37E+03	5.91E-08	50	1.18E-09	2.95E-06
Cm-243	2.91E+01	1.68E-08	50	3.36E-10	8.41E-07
Cm-244	1.81E+01	5.34E-07	100	5.34E-09	5.34E-05
Cm-245	8.50E+03	2.62E-11	50	5.24E-13	1.31E-09
Cm-246	4.76E+03	2.45E-13	50	4.90E-15	1.22E-11
Cm-247	1.56E+07	2.21E-19	20	1.10E-20	4.41E-18
Cm-248	3.48E+05	4.10E-20	10	4.10E-21	4.10E-19

Table B-8. Scaling factors based on various EBR-II driver fuel calculations.

Nuclide	K. Bunde MK-II fuel (Ci/kg-HM)	P. Kuan DP21 fuel (Ci/kg-HM)	J. Liaw EBR-II fuels (Ci/kg-HM)	EIS data EBR-II Driver (Ci/kg-HM)	Carboneau ORIGEN2 (Ci/kg-HM)	Best Estimate (Ci/kg-HM)	Comments
H-3	—	—	8.69E-01	1.23E+00	1.21E+00	1.21E+00	ORIGEN2
C-14	2.13E-03	4.09E-04	4.11E-04	1.99E-04	8.21E-04	8.21E-04	ORIGEN2
Cl-36	1.09E-06 ^a	1.83E-13	1.48E-17	—	1.01E-06	1.01E-06	ORIGEN2
Co-60	1.38E+02	6.19E-01	1.19E+00	4.81E-01	4.71E+00	4.71E+00	ORIGEN2
Ni-59	9.36E-03	9.57E-05	2.46E-03	—	3.51E-04	2.46E-03	Liaw data
Ni-63	6.98E-01	5.65E-03	9.50E-02	2.29E-01	5.39E-02	9.50E-02	Liaw data
Sr-90	—	1.78E+02	1.52E+02	1.97E+02	1.38E+02	1.78E+02	DP21 data
Nb-94	4.88E-04	3.30E-04	1.36E-04	—	9.42E-05	1.36E-04	Liaw data
Tc-99	—	3.35E-02	3.01E-02	—	1.91E-02	3.01E-02	Liaw data
I-129	—	8.42E-05	6.20E-05	7.35E-05	5.03E-05	6.20E-05	Liaw data
Cs-137	—	2.46E+02	1.71E+02	2.21E+02	1.48E+02	2.46E+02	DP21 data
Eu-152	—	1.25E-02	4.31E-03	—	1.33E-03	1.25E-02	DP21 data
Eu-154	—	1.30E+00	3.46E-01	5.67E-01	6.27E-01	1.30E+00	DP21 data
Pb-210	—	2.83E-11	2.83E-10	—	8.27E-14	2.83E-10	Liaw data
Ra-226	—	6.68E-10	2.64E-09	—	1.61E-14	2.64E-09	Liaw data
Ra-228	—	1.83E-14	2.97E-13	—	7.47E-17	2.97E-13	Liaw data
Ac-227	—	4.38E-09	8.72E-08	—	4.81E-11	8.72E-08	Liaw data
Th-228	—	1.43E-05	2.57E-05	5.14E-05	1.69E-08	2.57E-05	Liaw data
Th-229	—	1.40E-09	3.08E-09	—	6.34E-12	3.08E-09	Liaw data
Th-230	—	7.66E-07	1.21E-06	—	3.39E-10	1.21E-06	Liaw data
Th-232	—	1.18E-13	6.24E-13	—	6.62E-15	6.24E-13	Liaw data
Pa-231	—	6.98E-08	4.10E-07	—	8.93E-09	4.10E-07	Liaw data
U-232	—	2.88E-05	2.81E-05	—	5.12E-07	2.81E-05	Liaw data
U-233	—	2.61E-06	2.27E-06	—	3.98E-07	2.27E-06	Liaw data
U-234	—	2.18E-02	1.48E-02	4.04E-02	2.28E-04	1.48E-02	Liaw data
U-235	—	7.92E-04	1.34E-03	1.31E-03	1.32E-03	1.34E-03	Liaw data
U-236	—	7.63E-04	9.56E-04	1.21E-03	8.15E-04	9.56E-04	Liaw data
U-238	—	6.14E-05	1.16E-04	1.11E-04	1.09E-04	1.16E-04	Liaw data
Np-237	—	1.91E-04	1.98E-04	2.89E-04	1.01E-04	1.98E-04	Liaw data
Pu-238	—	2.98E-01	1.02E-01	1.66E-01	4.38E-02	1.02E-01	Liaw data
Pu-239	—	7.72E+00	3.37E-01	2.69E-01	2.45E-01	4.07E+00	Other data
Pu-240	—	4.14E+00	6.23E-02	9.11E-03	8.37E-03	6.23E-02	Liaw data
Pu-241	—	1.23E+02	1.07E+00	2.22E-03	2.50E-02	1.07E+00	Liaw data
Pu-242	—	1.29E-03	1.71E-05	—	3.97E-09	1.71E-05	Liaw data
Pu-244	—	9.39E-13	1.13E-14	—	—	1.13E-14	Liaw data
Am-241	—	8.03E-01	2.69E-02	3.91E-04	3.29E-06	2.69E-02	Liaw data
Am-243	—	1.09E-03	1.45E-05	—	7.01E-10	1.45E-05	Liaw data
Cm-243	—	1.75E-04	4.14E-06	—	7.09E-10	4.14E-06	Liaw data
Cm-244	—	1.05E-02	1.31E-04	—	1.76E-09	1.31E-04	Liaw data
Cm-245	—	2.98E-07	6.44E-09	—	1.64E-14	6.44E-09	Liaw data
Cm-246	—	1.88E-09	6.02E-11	—	4.28E-17	6.02E-11	Liaw data
Cm-247	—	1.10E-15	5.42E-17	—	—	5.42E-17	Liaw data
Cm-248	—	1.24E-16	1.01E-17	—	—	1.01E-17	Liaw data

a. Cl-36 result was determined based on a fluence of 9.3E21 nvt and a Cl-35 impurity of 70 ppm.

Table B-9. Best-estimate inventory associated with miscellaneous irradiated fuel in ANL-MOD-3H (1960 through 1970).

Best-estimate inventory for waste stream ANL-MOD-3H												
Kg of HM disposed =	1.00E-05	6.03E-02	8.30E-04	1.75E-01	2.69E+00	2.87E-02	4.30E-01	2.32E+00	5.41E+00	3.91E+00	2.30E+00	
Nuclide	Best-estimate Scaling Factor (Ci/kg-HM)	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)
H-3	1.21E+00	1.21E-05	7.27E-02	1.00E-03	2.10E-01	3.24E+00	3.46E-02	5.19E-01	2.80E+00	6.52E+00	4.71E+00	2.77E+00
C-14	8.21E-04	8.21E-09	4.95E-05	6.82E-07	1.43E-04	2.21E-03	2.36E-05	3.53E-04	1.91E-03	4.44E-03	3.21E-03	1.89E-03
Cl-36	1.01E-06	1.01E-11	6.11E-08	8.42E-10	1.77E-07	2.73E-06	2.91E-08	4.36E-07	2.35E-06	5.49E-06	3.96E-06	2.33E-06
Co-60	4.71E+00	4.71E-05	2.84E-01	3.91E-03	8.22E-01	1.27E+01	1.35E-01	2.02E+00	1.09E+01	2.55E+01	1.84E+01	1.08E+01
Ni-59	2.46E-03	2.46E-08	1.48E-04	2.04E-06	4.30E-04	6.62E-03	7.07E-05	1.06E-03	5.71E-03	1.33E-02	9.63E-03	5.66E-03
Ni-63	9.50E-02	9.50E-07	5.72E-03	7.88E-05	1.66E-02	2.56E-01	2.73E-03	4.08E-02	2.20E-01	5.14E-01	3.71E-01	2.18E-01
Sr-90	1.78E+02	1.78E-03	1.07E+01	1.48E-01	3.10E+01	4.78E+02	5.10E+00	7.64E+01	4.12E+02	9.61E+02	6.95E+02	4.09E+02
Nb-94	1.36E-04	1.36E-09	8.17E-06	1.13E-07	2.37E-05	3.65E-04	3.89E-06	5.83E-05	3.15E-04	7.33E-04	5.30E-04	3.12E-04
Tc-99	3.01E-02	3.01E-07	1.81E-03	2.49E-05	5.25E-03	8.08E-02	8.63E-04	1.29E-02	6.97E-02	1.63E-01	1.17E-01	6.91E-02
I-129	6.20E-05	6.20E-10	3.74E-06	5.15E-08	1.08E-05	1.67E-04	1.78E-06	2.67E-05	1.44E-04	3.36E-04	2.42E-04	1.43E-04
Cs-137	2.46E+02	2.46E-03	1.48E+01	2.04E-01	4.29E+01	6.61E+02	7.06E+00	1.06E+02	5.70E+02	1.33E+03	9.61E+02	5.65E+02
Eu-152	1.25E-02	1.25E-07	7.53E-04	1.04E-05	2.18E-03	3.36E-02	3.58E-04	5.37E-03	2.90E-02	6.76E-02	4.88E-02	2.87E-02
Eu-154	1.30E+00	1.30E-05	7.85E-02	1.08E-03	2.27E-01	3.50E+00	3.74E-02	5.60E-01	3.02E+00	7.05E+00	5.09E+00	3.00E+00
Pb-210	2.83E-10	2.83E-15	1.71E-11	2.35E-13	4.94E-11	7.62E-10	8.12E-12	1.22E-10	6.57E-10	1.53E-09	1.11E-09	6.51E-10
Ra-226	2.64E-09	2.64E-14	1.59E-10	2.19E-12	4.61E-10	7.10E-09	7.58E-11	1.14E-09	6.13E-09	1.43E-08	1.03E-08	6.07E-09
Ra-228	2.97E-13	2.97E-18	1.79E-14	2.47E-16	5.19E-14	8.00E-13	8.54E-15	1.28E-13	6.90E-13	1.61E-12	1.16E-12	6.84E-13
Ac-227	8.72E-08	8.72E-13	5.26E-09	7.24E-11	1.52E-08	2.35E-07	2.50E-09	3.75E-08	2.02E-07	4.72E-07	3.41E-07	2.01E-07
Th-228	2.57E-05	2.57E-10	1.55E-06	2.13E-08	4.48E-06	6.90E-05	7.36E-07	1.10E-05	5.95E-05	1.39E-04	1.00E-04	5.90E-05
Th-229	3.08E-09	3.08E-14	1.85E-10	2.55E-12	5.37E-10	8.28E-09	8.83E-11	1.32E-09	7.14E-09	1.66E-08	1.20E-08	7.08E-09
Th-230	1.21E-06	1.21E-11	7.31E-08	1.01E-09	2.12E-07	3.26E-06	3.48E-08	5.22E-07	2.81E-06	6.56E-06	4.74E-06	2.79E-06
Th-232	6.38E-06	6.38E-11	3.84E-07	5.29E-09	1.11E-06	1.72E-05	1.83E-07	2.74E-06	1.48E-05	3.45E-05	2.49E-05	1.47E-05
Pa-231	4.10E-07	4.10E-12	2.47E-08	3.40E-10	7.15E-08	1.10E-06	1.18E-08	1.76E-07	9.50E-07	2.22E-06	1.60E-06	9.42E-07

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Table B-9 (Part 2). Best-estimate inventory associated with miscellaneous irradiated fuel in ANL-MOD-3H (1960 through 1970).

Best-estimate inventory for waste stream ANL-MOD-3H												
Kg of HM disposed =	1.00E-05	6.03E-02	8.30E-04	1.75E-01	2.69E+00	2.87E-02	4.30E-01	2.32E+00	5.41E+00	3.91E+00	2.30E+00	
Nuclide	Best-estimate Scaling Factor (Ci/kg-HM)	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)
U-232	2.81E-05	2.81E-10	1.69E-06	2.33E-08	4.90E-06	7.55E-05	8.05E-07	1.21E-05	6.51E-05	1.52E-04	1.10E-04	6.45E-05
U-233	2.27E-06	2.27E-11	1.37E-07	1.89E-09	3.97E-07	6.12E-06	6.53E-08	9.78E-07	5.28E-06	1.23E-05	8.89E-06	5.23E-06
U-234	1.48E-02	1.48E-07	8.94E-04	1.23E-05	2.59E-03	3.99E-02	4.26E-04	6.38E-03	3.44E-02	8.03E-02	5.80E-02	3.41E-02
U-235	6.05E-04	6.05E-09	3.65E-05	5.02E-07	1.06E-04	1.63E-03	1.74E-05	2.60E-04	1.40E-03	3.27E-03	2.37E-03	1.39E-03
U-236	9.56E-04	9.56E-09	5.76E-05	7.93E-07	1.67E-04	2.57E-03	2.74E-05	4.11E-04	2.22E-03	5.17E-03	3.74E-03	2.20E-03
U-238	1.16E-04	1.16E-09	7.01E-06	9.65E-08	2.03E-05	3.13E-04	3.34E-06	5.00E-05	2.70E-04	6.29E-04	4.54E-04	2.67E-04
Np-237	1.98E-04	1.98E-09	1.19E-05	1.64E-07	3.45E-05	5.32E-04	5.68E-06	8.50E-05	4.59E-04	1.07E-03	7.73E-04	4.55E-04
Pu-238	1.02E-01	1.02E-06	6.15E-03	8.47E-05	1.78E-02	2.75E-01	2.93E-03	4.39E-02	2.37E-01	5.52E-01	3.99E-01	2.35E-01
Pu-239	4.07E+00	4.07E-05	2.45E-01	3.38E-03	7.11E-01	1.10E+01	1.17E-01	1.75E+00	9.45E+00	2.20E+01	1.59E+01	9.37E+00
Pu-240	6.23E-02	6.23E-07	3.76E-03	5.17E-05	1.09E-02	1.68E-01	1.79E-03	2.68E-02	1.45E-01	3.37E-01	2.44E-01	1.43E-01
Pu-241	1.07E+00	1.07E-05	6.46E-02	8.90E-04	1.87E-01	2.88E+00	3.08E-02	4.61E-01	2.49E+00	5.80E+00	4.19E+00	2.47E+00
Pu-242	1.71E-05	1.71E-10	1.03E-06	1.42E-08	2.99E-06	4.61E-05	4.92E-07	7.37E-06	3.98E-05	9.28E-05	6.70E-05	3.94E-05
Pu-244	1.13E-14	1.13E-19	6.83E-16	9.41E-18	1.98E-15	3.05E-14	3.25E-16	4.87E-15	2.63E-14	6.13E-14	4.43E-14	2.61E-14
Am-241	2.69E-02	2.69E-07	1.62E-03	2.23E-05	4.69E-03	7.23E-02	7.71E-04	1.16E-02	6.23E-02	1.45E-01	1.05E-01	6.18E-02
Am-243	1.45E-05	1.45E-10	8.75E-07	1.21E-08	2.53E-06	3.91E-05	4.17E-07	6.24E-06	3.37E-05	7.86E-05	5.68E-05	3.34E-05
Cm-243	4.14E-06	4.14E-11	2.49E-07	3.43E-09	7.22E-07	1.11E-05	1.19E-07	1.78E-06	9.59E-06	2.24E-05	1.62E-05	9.51E-06
Cm-244	1.31E-04	1.31E-09	7.91E-06	1.09E-07	2.29E-05	3.53E-04	3.77E-06	5.64E-05	3.04E-04	7.10E-04	5.13E-04	3.02E-04
Cm-245	6.44E-09	6.44E-14	3.88E-10	5.35E-12	1.12E-09	1.73E-08	1.85E-10	2.77E-09	1.49E-08	3.48E-08	2.52E-08	1.48E-08
Cm-246	6.02E-11	6.02E-16	3.63E-12	5.00E-14	1.05E-11	1.62E-10	1.73E-12	2.59E-11	1.40E-10	3.26E-10	2.35E-10	1.38E-10
Cm-247	5.42E-17	5.42E-22	3.27E-18	4.50E-20	9.46E-18	1.46E-16	1.56E-18	2.33E-17	1.26E-16	2.93E-16	2.12E-16	1.25E-16
Cm-248	1.01E-17	1.01E-22	6.07E-19	8.36E-21	1.76E-18	2.71E-17	2.89E-19	4.33E-18	2.34E-17	5.45E-17	3.94E-17	2.32E-17
Totals =		4.42E-03	2.66E+01	3.67E-01	7.71E+01	1.19E+03	1.27E+01	1.90E+02	1.02E+03	2.39E+03	1.73E+03	1.02E+03

File = "NEW fuelbearing wastes.xls"

Table B-10. Lower-bound activity associated with miscellaneous irradiated fuel in ANL-MOD-3H (1960 through 1970).

Lower-bound inventory for waste stream ANL-MOD-3H												
Kg of HM disposed =	1.00E-05	6.03E-02	8.30E-04	1.75E-01	2.69E+00	2.87E-02	4.30E-01	2.32E+00	5.41E+00	3.91E+00	2.30E+00	
Nuclide	Minimum Scaling Factor (Ci/kg-HM)	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)
H-3	2.41E-01	2.41E-06	1.45E-02	2.00E-04	4.21E-02	6.49E-01	6.92E-03	1.04E-01	5.60E-01	1.30E+00	9.43E-01	5.55E-01
C-14	1.64E-04	1.64E-09	9.90E-06	1.36E-07	2.87E-05	4.42E-04	4.71E-06	7.06E-05	3.81E-04	8.89E-04	6.42E-04	3.78E-04
Cl-36	1.01E-08	1.01E-13	6.11E-10	8.42E-12	1.77E-09	2.73E-08	2.91E-10	4.36E-09	2.35E-08	5.49E-08	3.96E-08	2.33E-08
Co-60	4.71E-01	4.71E-06	2.84E-02	3.91E-04	8.22E-02	1.27E+00	1.35E-02	2.02E-01	1.09E+00	2.55E+00	1.84E+00	1.08E+00
Ni-59	2.46E-04	2.46E-09	1.48E-05	2.04E-07	4.30E-05	6.62E-04	7.07E-06	1.06E-04	5.71E-04	1.33E-03	9.63E-04	5.66E-04
Ni-63	4.75E-02	4.75E-07	2.86E-03	3.94E-05	8.29E-03	1.28E-01	1.36E-03	2.04E-02	1.10E-01	2.57E-01	1.86E-01	1.09E-01
Sr-90	8.89E+01	8.89E-04	5.36E+00	7.38E-02	1.55E+01	2.39E+02	2.55E+00	3.82E+01	2.06E+02	4.81E+02	3.47E+02	2.04E+02
Nb-94	4.52E-05	4.52E-10	2.72E-06	3.75E-08	7.89E-06	1.22E-04	1.30E-06	1.94E-05	1.05E-04	2.44E-04	1.77E-04	1.04E-04
Tc-99	1.50E-02	1.50E-07	9.06E-04	1.25E-05	2.62E-03	4.04E-02	4.31E-04	6.46E-03	3.49E-02	8.13E-02	5.87E-02	3.46E-02
I-129	3.10E-05	3.10E-10	1.87E-06	2.57E-08	5.41E-06	8.34E-05	8.90E-07	1.33E-05	7.20E-05	1.68E-04	1.21E-04	7.13E-05
Cs-137	1.23E+02	1.23E-03	7.41E+00	1.02E-01	2.15E+01	3.31E+02	3.53E+00	5.29E+01	2.85E+02	6.65E+02	4.80E+02	2.83E+02
Eu-152	2.50E-03	2.50E-08	1.51E-04	2.07E-06	4.36E-04	6.72E-03	7.17E-05	1.07E-03	5.79E-03	1.35E-02	9.76E-03	5.74E-03
Eu-154	2.61E-01	2.61E-06	1.57E-02	2.16E-04	4.55E-02	7.01E-01	7.48E-03	1.12E-01	6.05E-01	1.41E+00	1.02E+00	5.99E-01
Pb-210	2.83E-11	2.83E-16	1.71E-12	2.35E-14	4.94E-12	7.62E-11	8.12E-13	1.22E-11	6.57E-11	1.53E-10	1.11E-10	6.51E-11
Ra-226	5.28E-10	5.28E-15	3.18E-11	4.38E-13	9.22E-11	1.42E-09	1.52E-11	2.27E-10	1.23E-09	2.86E-09	2.06E-09	1.21E-09
Ra-228	1.49E-14	1.49E-19	8.96E-16	1.23E-17	2.60E-15	4.00E-14	4.27E-16	6.40E-15	3.45E-14	8.05E-14	5.81E-14	3.42E-14
Ac-227	4.36E-09	4.36E-14	2.63E-10	3.62E-12	7.61E-10	1.17E-08	1.25E-10	1.88E-09	1.01E-08	2.36E-08	1.70E-08	1.00E-08
Th-228	5.13E-07	5.13E-12	3.09E-08	4.26E-10	8.96E-08	1.38E-06	1.47E-08	2.21E-07	1.19E-06	2.78E-06	2.01E-06	1.18E-06
Th-229	1.03E-09	1.03E-14	6.18E-11	8.51E-13	1.79E-10	2.76E-09	2.94E-11	4.41E-10	2.38E-09	5.55E-09	4.01E-09	2.36E-09
Th-230	6.06E-07	6.06E-12	3.65E-08	5.03E-10	1.06E-07	1.63E-06	1.74E-08	2.61E-07	1.41E-06	3.28E-06	2.37E-06	1.39E-06
Th-232	1.28E-06	1.28E-11	7.69E-08	1.06E-09	2.23E-07	3.43E-06	3.66E-08	5.48E-07	2.96E-06	6.90E-06	4.99E-06	2.93E-06
Pa-231	8.19E-08	8.19E-13	4.94E-09	6.80E-11	1.43E-08	2.20E-07	2.35E-09	3.52E-08	1.90E-07	4.43E-07	3.20E-07	1.88E-07

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Table B-10 (Part 2). Lower-bound activity associated with miscellaneous irradiated fuel in ANL-MOD-3H (1960 through 1970).

Lower-bound inventory for waste stream ANL-MOD-3H												
Kg of HM disposed =	1.00E-05	6.03E-02	8.30E-04	1.75E-01	2.69E+00	2.87E-02	4.30E-01	2.32E+00	5.41E+00	3.91E+00	2.30E+00	
Nuclide	Minimum Scaling Factor (Ci/kg-HM)	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)
U-232	1.40E-05	1.40E-10	8.45E-07	1.16E-08	2.45E-06	3.77E-05	4.03E-07	6.03E-06	3.25E-05	7.59E-05	5.48E-05	3.23E-05
U-233	1.14E-06	1.14E-11	6.85E-08	9.44E-10	1.98E-07	3.06E-06	3.26E-08	4.89E-07	2.64E-06	6.15E-06	4.45E-06	2.62E-06
U-234	7.42E-03	7.42E-08	4.47E-04	6.16E-06	1.29E-03	2.00E-02	2.13E-04	3.19E-03	1.72E-02	4.01E-02	2.90E-02	1.71E-02
U-235	5.50E-04	5.50E-09	3.32E-05	4.57E-07	9.61E-05	1.48E-03	1.58E-05	2.37E-04	1.28E-03	2.98E-03	2.15E-03	1.27E-03
U-236	4.78E-04	4.78E-09	2.88E-05	3.97E-07	8.34E-05	1.29E-03	1.37E-05	2.05E-04	1.11E-03	2.59E-03	1.87E-03	1.10E-03
U-238	5.81E-05	5.81E-10	3.50E-06	4.82E-08	1.01E-05	1.56E-04	1.67E-06	2.50E-05	1.35E-04	3.14E-04	2.27E-04	1.34E-04
Np-237	9.89E-05	9.89E-10	5.96E-06	8.21E-08	1.73E-05	2.66E-04	2.84E-06	4.25E-05	2.29E-04	5.35E-04	3.87E-04	2.27E-04
Pu-238	3.40E-02	3.40E-07	2.05E-03	2.82E-05	5.94E-03	9.15E-02	9.76E-04	1.46E-02	7.89E-02	1.84E-01	1.33E-01	7.83E-02
Pu-239	2.04E+00	2.04E-05	1.23E-01	1.69E-03	3.55E-01	5.48E+00	5.84E-02	8.76E-01	4.72E+00	1.10E+01	7.96E+00	4.68E+00
Pu-240	6.23E-03	6.23E-08	3.76E-04	5.17E-06	1.09E-03	1.68E-02	1.79E-04	2.68E-03	1.45E-02	3.37E-02	2.44E-02	1.43E-02
Pu-241	2.14E-02	2.14E-07	1.29E-03	1.78E-05	3.74E-03	5.77E-02	6.16E-04	9.22E-03	4.98E-02	1.16E-01	8.38E-02	4.93E-02
Pu-242	1.71E-06	1.71E-11	1.03E-07	1.42E-09	2.99E-07	4.61E-06	4.92E-08	7.37E-07	3.98E-06	9.28E-06	6.70E-06	3.94E-06
Pu-244	1.13E-15	1.13E-20	6.83E-17	9.41E-19	1.98E-16	3.05E-15	3.25E-17	4.87E-16	2.63E-15	6.13E-15	4.43E-15	2.61E-15
Am-241	2.69E-03	2.69E-08	1.62E-04	2.23E-06	4.69E-04	7.23E-03	7.71E-05	1.16E-03	6.23E-03	1.45E-02	1.05E-02	6.18E-03
Am-243	2.90E-07	2.90E-12	1.75E-08	2.41E-10	5.07E-08	7.81E-07	8.34E-09	1.25E-07	6.74E-07	1.57E-06	1.14E-06	6.68E-07
Cm-243	8.27E-08	8.27E-13	4.98E-09	6.86E-11	1.44E-08	2.22E-07	2.37E-09	3.56E-08	1.92E-07	4.47E-07	3.23E-07	1.90E-07
Cm-244	1.31E-06	1.31E-11	7.91E-08	1.09E-09	2.29E-07	3.53E-06	3.77E-08	5.64E-07	3.04E-06	7.10E-06	5.13E-06	3.02E-06
Cm-245	1.29E-10	1.29E-15	7.76E-12	1.07E-13	2.25E-11	3.46E-10	3.70E-12	5.54E-11	2.99E-10	6.97E-10	5.03E-10	2.96E-10
Cm-246	1.20E-12	1.20E-17	7.26E-14	9.99E-16	2.10E-13	3.24E-12	3.46E-14	5.18E-13	2.79E-12	6.51E-12	4.71E-12	2.77E-12
Cm-247	2.71E-18	2.71E-23	1.63E-19	2.25E-21	4.73E-19	7.29E-18	7.78E-20	1.17E-18	6.29E-18	1.47E-17	1.06E-17	6.23E-18
Cm-248	1.01E-18	1.01E-23	6.07E-20	8.36E-22	1.76E-19	2.71E-18	2.89E-20	4.33E-19	2.34E-18	5.45E-18	3.94E-18	2.32E-18
Totals =		2.16E-03	1.30E+01	1.80E-01	3.78E+01	5.82E+02	6.21E+00	9.31E+01	5.02E+02	1.17E+03	8.46E+02	4.98E+02

File = "NEW fuelbearing wastes.xls"

Table B-11. Upper-bound activity associated with miscellaneous irradiated fuel in ANL-MOD-3H (1960 through 1970).

Upper-bound inventory for waste stream ANL-MOD-3H												
Kg of HM disposed =	1.00E-05	6.03E-02	8.30E-04	1.75E-01	2.69E+00	2.87E-02	4.30E-01	2.32E+00	5.41E+00	3.91E+00	2.30E+00	
Nuclide	Maximum Scaling Factor (Ci/kg-HM)	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)
H-3	6.03E+00	6.03E-05	3.63E-01	5.00E-03	1.05E+00	1.62E+01	1.73E-01	2.59E+00	1.40E+01	3.26E+01	2.36E+01	1.39E+01
C-14	4.10E-03	4.11E-08	2.48E-04	3.41E-06	7.17E-04	1.10E-02	1.18E-04	1.77E-03	9.53E-03	2.22E-02	1.61E-02	9.45E-03
Cl-36	1.01E-04	1.01E-09	6.11E-06	8.42E-08	1.77E-05	2.73E-04	2.91E-06	4.36E-05	2.35E-04	5.49E-04	3.96E-04	2.33E-04
Co-60	4.71E+01	4.71E-04	2.84E+00	3.91E-02	8.22E+00	1.27E+02	1.35E+00	2.02E+01	1.09E+02	2.55E+02	1.84E+02	1.08E+02
Ni-59	2.46E-02	2.46E-07	1.48E-03	2.04E-05	4.30E-03	6.62E-02	7.07E-04	1.06E-02	5.71E-02	1.33E-01	9.63E-02	5.66E-02
Ni-63	1.90E-01	1.90E-06	1.14E-02	1.58E-04	3.32E-02	5.11E-01	5.45E-03	8.17E-02	4.41E-01	1.03E+00	7.43E-01	4.37E-01
Sr-90	3.55E+02	3.55E-03	2.14E+01	2.95E-01	6.20E+01	9.56E+02	1.02E+01	1.53E+02	8.25E+02	1.92E+03	1.39E+03	8.18E+02
Nb-94	4.07E-04	4.07E-09	2.45E-05	3.38E-07	7.10E-05	1.09E-03	1.17E-05	1.75E-04	9.44E-04	2.20E-03	1.59E-03	9.35E-04
Tc-99	6.01E-02	6.01E-07	3.62E-03	4.99E-05	1.05E-02	1.62E-01	1.73E-03	2.58E-02	1.39E-01	3.25E-01	2.35E-01	1.38E-01
I-129	1.24E-04	1.24E-09	7.48E-06	1.03E-07	2.17E-05	3.34E-04	3.56E-06	5.34E-05	2.88E-04	6.71E-04	4.85E-04	2.85E-04
Cs-137	4.92E+02	4.92E-03	2.96E+01	4.08E-01	8.58E+01	1.32E+03	1.41E+01	2.11E+02	1.14E+03	2.66E+03	1.92E+03	1.13E+03
Eu-152	6.24E-02	6.24E-07	3.76E-03	5.18E-05	1.09E-02	1.68E-01	1.79E-03	2.68E-02	1.45E-01	3.38E-01	2.44E-01	1.44E-01
Eu-154	6.51E+00	6.51E-05	3.93E-01	5.41E-03	1.14E+00	1.75E+01	1.87E-01	2.80E+00	1.51E+01	3.52E+01	2.55E+01	1.50E+01
Pb-210	2.83E-09	2.83E-14	1.71E-10	2.35E-12	4.94E-10	7.62E-09	8.12E-11	1.22E-09	6.57E-09	1.53E-08	1.11E-08	6.51E-09
Ra-226	1.32E-08	1.32E-13	7.96E-10	1.10E-11	2.30E-09	3.55E-08	3.79E-10	5.68E-09	3.06E-08	7.14E-08	5.16E-08	3.04E-08
Ra-228	5.95E-12	5.95E-17	3.59E-13	4.94E-15	1.04E-12	1.60E-11	1.71E-13	2.56E-12	1.38E-11	3.22E-11	2.33E-11	1.37E-11
Ac-227	1.74E-06	1.74E-11	1.05E-07	1.45E-09	3.05E-07	4.69E-06	5.01E-08	7.50E-07	4.05E-06	9.44E-06	6.82E-06	4.01E-06
Th-228	1.28E-03	1.28E-08	7.73E-05	1.06E-06	2.24E-04	3.45E-03	3.68E-05	5.52E-04	2.98E-03	6.94E-03	5.01E-03	2.95E-03
Th-229	9.23E-09	9.23E-14	5.56E-10	7.66E-12	1.61E-09	2.48E-08	2.65E-10	3.97E-09	2.14E-08	4.99E-08	3.61E-08	2.12E-08
Th-230	2.43E-06	2.43E-11	1.46E-07	2.01E-09	4.23E-07	6.52E-06	6.96E-08	1.04E-06	5.63E-06	1.31E-05	9.48E-06	5.58E-06
Th-232	3.19E-05	3.19E-10	1.92E-06	2.65E-08	5.57E-06	8.58E-05	9.15E-07	1.37E-05	7.40E-05	1.73E-04	1.25E-04	7.33E-05
Pa-231	2.05E-06	2.05E-11	1.23E-07	1.70E-09	3.57E-07	5.51E-06	5.88E-08	8.81E-07	4.75E-06	1.11E-05	8.01E-06	4.71E-06

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Table B-11 (Part 2). Upper-bound activity associated with miscellaneous irradiated fuel in ANL-MOD-3H (1960 through 1970).

Upper-bound inventory for waste stream ANL-MOD-3H												
Kg of HM disposed =	1.00E-05	6.03E-02	8.30E-04	1.75E-01	2.69E+00	2.87E-02	4.30E-01	2.32E+00	5.41E+00	3.91E+00	2.30E+00	
Nuclide	Maximum Scaling Factor (Ci/kg-HM)	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)	1968 (Ci)	1969 (Ci)	1970 (Ci)
U-232	5.61E-05	5.61E-10	3.38E-06	4.66E-08	9.79E-06	1.51E-04	1.61E-06	2.41E-05	1.30E-04	3.04E-04	2.19E-04	1.29E-04
U-233	4.55E-06	4.55E-11	2.74E-07	3.78E-09	7.94E-07	1.22E-05	1.31E-07	1.96E-06	1.06E-05	2.46E-05	1.78E-05	1.05E-05
U-234	2.97E-02	2.97E-07	1.79E-03	2.46E-05	5.18E-03	7.98E-02	8.52E-04	1.28E-02	6.88E-02	1.61E-01	1.16E-01	6.83E-02
U-235	6.66E-04	6.66E-09	4.01E-05	5.53E-07	1.16E-04	1.79E-03	1.91E-05	2.86E-04	1.54E-03	3.60E-03	2.60E-03	1.53E-03
U-236	1.91E-03	1.91E-08	1.15E-04	1.59E-06	3.34E-04	5.14E-03	5.49E-05	8.22E-04	4.43E-03	1.03E-02	7.47E-03	4.40E-03
U-238	2.32E-04	2.32E-09	1.40E-05	1.93E-07	4.06E-05	6.25E-04	6.67E-06	1.00E-04	5.39E-04	1.26E-03	9.09E-04	5.35E-04
Np-237	3.96E-04	3.96E-09	2.38E-05	3.28E-07	6.90E-05	1.06E-03	1.14E-05	1.70E-04	9.18E-04	2.14E-03	1.55E-03	9.10E-04
Pu-238	3.06E-01	3.06E-06	1.85E-02	2.54E-04	5.34E-02	8.24E-01	8.79E-03	1.32E-01	7.10E-01	1.66E+00	1.20E+00	7.04E-01
Pu-239	8.14E+00	8.14E-05	4.91E-01	6.76E-03	1.42E+00	2.19E+01	2.34E-01	3.50E+00	1.89E+01	4.41E+01	3.18E+01	1.87E+01
Pu-240	6.23E-01	6.23E-06	3.76E-02	5.17E-04	1.09E-01	1.68E+00	1.79E-02	2.68E-01	1.45E+00	3.37E+00	2.44E+00	1.43E+00
Pu-241	5.36E+01	5.36E-04	3.23E+00	4.45E-02	9.36E+00	1.44E+02	1.54E+00	2.31E+01	1.24E+02	2.90E+02	2.10E+02	1.23E+02
Pu-242	1.71E-04	1.71E-09	1.03E-05	1.42E-07	2.99E-05	4.61E-04	4.92E-06	7.37E-05	3.98E-04	9.28E-04	6.70E-04	3.94E-04
Pu-244	1.13E-13	1.13E-18	6.83E-15	9.41E-17	1.98E-14	3.05E-13	3.25E-15	4.87E-14	2.63E-13	6.13E-13	4.43E-13	2.61E-13
Am-241	2.69E-01	2.69E-06	1.62E-02	2.23E-04	4.69E-02	7.23E-01	7.71E-03	1.16E-01	6.23E-01	1.45E+00	1.05E+00	6.18E-01
Am-243	7.26E-04	7.26E-09	4.38E-05	6.03E-07	1.27E-04	1.95E-03	2.08E-05	3.12E-04	1.68E-03	3.93E-03	2.84E-03	1.67E-03
Cm-243	2.07E-04	2.07E-09	1.25E-05	1.72E-07	3.61E-05	5.56E-04	5.93E-06	8.89E-05	4.80E-04	1.12E-03	8.08E-04	4.76E-04
Cm-244	1.31E-02	1.31E-07	7.91E-04	1.09E-05	2.29E-03	3.53E-02	3.77E-04	5.64E-03	3.04E-02	7.10E-02	5.13E-02	3.02E-02
Cm-245	3.22E-07	3.22E-12	1.94E-08	2.67E-10	5.62E-08	8.66E-07	9.24E-09	1.38E-07	7.47E-07	1.74E-06	1.26E-06	7.41E-07
Cm-246	3.01E-09	3.01E-14	1.81E-10	2.50E-12	5.25E-10	8.10E-09	8.64E-11	1.29E-09	6.98E-09	1.63E-08	1.18E-08	6.92E-09
Cm-247	1.08E-15	1.08E-20	6.53E-17	9.00E-19	1.89E-16	2.92E-15	3.11E-17	4.66E-16	2.52E-15	5.87E-15	4.24E-15	2.49E-15
Cm-248	1.01E-16	1.01E-21	6.07E-18	8.36E-20	1.76E-17	2.71E-16	2.89E-18	4.33E-17	2.34E-16	5.45E-16	3.94E-16	2.32E-16
Totals =		9.73E-03	5.87E+01	8.08E-01	1.70E+02	2.62E+03	2.79E+01	4.19E+02	2.26E+03	5.27E+03	3.80E+03	2.24E+03

File = "NEW fuelbearing wastes.xls"

Table B-12. Best-estimate inventory associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Best-estimate inventory for waste stream ANL-MOD-2H														
Kg of HM Disposed =	4.61E+00	5.20E+00	1.66E+00	5.22E-01	2.55E+00	1.93E+00	1.13E+00	4.72E-01	9.02E-02	2.33E-01	3.45E-01	—	8.61E-01	
Nuclide	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	
H-3	3.79E-03	4.27E-03	1.36E-03	4.29E-04	2.10E-03	1.58E-03	9.30E-04	3.88E-04	7.41E-05	1.91E-04	2.83E-04	—	7.07E-04	
C-14	4.68E-06	5.27E-06	1.68E-06	5.29E-07	2.59E-06	1.95E-06	1.15E-06	4.78E-07	9.14E-08	2.36E-07	3.50E-07	—	8.73E-07	
Cl-36	2.17E+01	2.45E+01	7.81E+00	2.46E+00	1.20E+01	9.07E+00	5.33E+00	2.22E+00	4.25E-01	1.10E+00	1.62E+00	—	4.05E+00	
Co-60	1.14E-02	1.28E-02	4.09E-03	1.28E-03	6.28E-03	4.74E-03	2.79E-03	1.16E-03	2.22E-04	5.73E-04	8.50E-04	—	2.12E-03	
Ni-59	4.38E-01	4.94E-01	1.58E-01	4.96E-02	2.42E-01	1.83E-01	1.08E-01	4.48E-02	8.56E-03	2.21E-02	3.28E-02	—	8.18E-02	
Ni-63	4.38E-01	4.94E-01	1.58E-01	4.96E-02	2.42E-01	1.83E-01	1.08E-01	4.48E-02	8.56E-03	2.21E-02	3.28E-02	—	8.18E-02	
Sr-90	8.20E+02	9.24E+02	2.95E+02	9.27E+01	4.53E+02	3.42E+02	2.01E+02	8.38E+01	1.60E+01	4.14E+01	6.13E+01	—	1.53E+02	
Nb-94	6.25E-04	7.05E-04	2.25E-04	7.07E-05	3.46E-04	2.61E-04	1.54E-04	6.40E-05	1.22E-05	3.16E-05	4.68E-05	—	1.17E-04	
Tc-99	1.39E-01	1.56E-01	4.99E-02	1.57E-02	7.67E-02	5.79E-02	3.40E-02	1.42E-02	2.71E-03	7.00E-03	1.04E-02	—	2.59E-02	
I-129	2.86E-04	3.23E-04	1.03E-04	3.24E-05	1.58E-04	1.19E-04	7.03E-05	2.93E-05	5.59E-06	1.44E-05	2.14E-05	—	5.34E-05	
Cs-137	1.13E+03	1.28E+03	4.08E+02	1.28E+02	6.27E+02	4.73E+02	2.78E+02	1.16E+02	2.22E+01	5.72E+01	8.48E+01	—	2.12E+02	
Eu-152	5.76E-02	6.49E-02	2.07E-02	6.52E-03	3.19E-02	2.40E-02	1.41E-02	5.89E-03	1.13E-03	2.91E-03	4.31E-03	—	1.07E-02	
Eu-154	6.01E+00	6.77E+00	2.16E+00	6.80E-01	3.32E+00	2.51E+00	1.48E+00	6.15E-01	1.17E-01	3.03E-01	4.50E-01	—	1.12E+00	
Pb-210	1.31E-09	1.47E-09	4.70E-10	1.48E-10	7.22E-10	5.45E-10	3.21E-10	1.34E-10	2.55E-11	6.59E-11	9.77E-11	—	2.44E-10	
Ra-226	1.22E-08	1.37E-08	4.38E-09	1.38E-09	6.74E-09	5.09E-09	2.99E-09	1.25E-09	2.38E-10	6.15E-10	9.11E-10	—	2.27E-09	
Ra-228	1.37E-12	1.55E-12	4.94E-13	1.55E-13	7.59E-13	5.73E-13	3.37E-13	1.40E-13	2.68E-14	6.93E-14	1.03E-13	—	2.56E-13	
Ac-227	4.02E-07	4.54E-07	1.45E-07	4.55E-08	2.23E-07	1.68E-07	9.88E-08	4.12E-08	7.87E-09	2.03E-08	3.01E-08	—	7.51E-08	
Th-228	1.18E-04	1.33E-04	4.26E-05	1.34E-05	6.55E-05	4.94E-05	2.91E-05	1.21E-05	2.31E-06	5.97E-06	8.85E-06	—	2.21E-05	
Th-229	1.42E-08	1.60E-08	5.10E-09	1.61E-09	7.85E-09	5.92E-09	3.49E-09	1.45E-09	2.77E-10	7.16E-10	1.06E-09	—	2.65E-09	
Th-230	5.60E-06	6.31E-06	2.01E-06	6.33E-07	3.09E-06	2.34E-06	1.37E-06	5.72E-07	1.09E-07	2.82E-07	4.18E-07	—	1.04E-06	
Th-232	2.94E-05	3.32E-05	1.06E-05	3.33E-06	1.63E-05	1.23E-05	7.22E-06	3.01E-06	5.75E-07	1.49E-06	2.20E-06	—	5.49E-06	
Pa-231	1.89E-06	2.13E-06	6.80E-07	2.14E-07	1.05E-06	7.89E-07	4.64E-07	1.93E-07	3.69E-08	9.54E-08	1.41E-07	—	3.53E-07	

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Table B-12 (Part 2). Best-estimate inventory associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Best-estimate inventory for waste stream ANL-MOD-2H													
Kg of HM Disposed =	4.61E+00	5.20E+00	1.66E+00	5.22E-01	2.55E+00	1.93E+00	1.13E+00	4.72E-01	9.02E-02	2.33E-01	3.45E-01	—	8.61E-01
Nuclide	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)
U-232	1.29E-04	1.46E-04	4.65E-05	1.46E-05	7.16E-05	5.40E-05	3.18E-05	1.32E-05	2.53E-06	6.53E-06	9.68E-06	—	2.41E-05
U-233	1.05E-05	1.18E-05	3.77E-06	1.19E-06	5.80E-06	4.38E-06	2.58E-06	1.07E-06	2.05E-07	5.30E-07	7.85E-07	—	1.96E-06
U-234	6.85E-02	7.72E-02	2.46E-02	7.74E-03	3.79E-02	2.86E-02	1.68E-02	7.00E-03	1.34E-03	3.45E-03	5.12E-03	—	1.28E-02
U-235	2.79E-03	3.15E-03	1.00E-03	3.16E-04	1.54E-03	1.17E-03	6.86E-04	2.86E-04	5.46E-05	1.41E-04	2.09E-04	—	5.21E-04
U-236	4.41E-03	4.97E-03	1.59E-03	4.99E-04	2.44E-03	1.84E-03	1.08E-03	4.51E-04	8.62E-05	2.23E-04	3.30E-04	—	8.23E-04
U-238	5.36E-04	6.04E-04	1.93E-04	6.06E-05	2.97E-04	2.24E-04	1.32E-04	5.48E-05	1.05E-05	2.71E-05	4.01E-05	—	1.00E-04
Np-237	9.12E-04	1.03E-03	3.28E-04	1.03E-04	5.05E-04	3.81E-04	2.24E-04	9.33E-05	1.78E-05	4.60E-05	6.82E-05	—	1.70E-04
Pu-238	4.71E-01	5.31E-01	1.69E-01	5.33E-02	2.60E-01	1.97E-01	1.16E-01	4.82E-02	9.20E-03	2.38E-02	3.52E-02	—	8.79E-02
Pu-239	1.88E+01	2.12E+01	6.76E+00	2.12E+00	1.04E+01	7.84E+00	4.61E+00	1.92E+00	3.67E-01	9.48E-01	1.41E+00	—	3.51E+00
Pu-240	2.88E-01	3.24E-01	1.03E-01	3.25E-02	1.59E-01	1.20E-01	7.06E-02	2.94E-02	5.62E-03	1.45E-02	2.15E-02	—	5.37E-02
Pu-241	4.95E+00	5.58E+00	1.78E+00	5.59E-01	2.74E+00	2.06E+00	1.21E+00	5.06E-01	9.67E-02	2.50E-01	3.70E-01	—	9.23E-01
Pu-242	7.91E-05	8.92E-05	2.84E-05	8.95E-06	4.37E-05	3.30E-05	1.94E-05	8.09E-06	1.55E-06	3.99E-06	5.92E-06	—	1.48E-05
Pu-244	5.23E-14	5.89E-14	1.88E-14	5.91E-15	2.89E-14	2.18E-14	1.28E-14	5.35E-15	1.02E-15	2.64E-15	3.91E-15	—	9.76E-15
Am-241	1.24E-01	1.40E-01	4.46E-02	1.40E-02	6.85E-02	5.17E-02	3.04E-02	1.27E-02	2.42E-03	6.25E-03	9.27E-03	—	2.31E-02
Am-243	6.70E-05	7.55E-05	2.41E-05	7.58E-06	3.71E-05	2.80E-05	1.64E-05	6.85E-06	1.31E-06	3.38E-06	5.01E-06	—	1.25E-05
Cm-243	1.91E-05	2.15E-05	6.86E-06	2.16E-06	1.06E-05	7.96E-06	4.68E-06	1.95E-06	3.73E-07	9.63E-07	1.43E-06	—	3.56E-06
Cm-244	6.05E-04	6.82E-04	2.18E-04	6.85E-05	3.35E-04	2.53E-04	1.49E-04	6.19E-05	1.18E-05	3.06E-05	4.53E-05	—	1.13E-04
Cm-245	2.97E-08	3.35E-08	1.07E-08	3.36E-09	1.64E-08	1.24E-08	7.29E-09	3.04E-09	5.81E-10	1.50E-09	2.22E-09	—	5.54E-09
Cm-246	2.78E-10	3.13E-10	9.99E-11	3.14E-11	1.54E-10	1.16E-10	6.82E-11	2.84E-11	5.43E-12	1.40E-11	2.08E-11	—	5.18E-11
Cm-247	2.50E-16	2.82E-16	8.99E-17	2.83E-17	1.38E-16	1.04E-16	6.14E-17	2.56E-17	4.89E-18	1.26E-17	1.87E-17	—	4.67E-17
Cm-248	4.65E-17	5.24E-17	1.67E-17	5.26E-18	2.57E-17	1.94E-17	1.14E-17	4.75E-18	9.08E-19	2.35E-18	3.48E-18	—	8.67E-18
Totals =	2.04E+03	2.30E+03	7.33E+02	2.30E+02	1.13E+03	8.50E+02	5.00E+02	2.08E+02	3.98E+01	1.03E+02	1.52E+02	—	3.80E+02

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Table B-12 (Part 3). Best-estimate inventory associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Best-estimate inventory for waste stream ANL-MOD-2H (extended data)										
Kg of HM Disposed =	—	2.79E-02	9.14E-02	4.27E-01	1.58E+01	—	—	—	—	—
Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)
H-3	—	2.30E-05	7.51E-05	3.51E-04	1.29E-02	—	—	—	—	—
C-14	—	2.83E-08	9.27E-08	4.33E-07	1.60E-05	—	—	—	—	—
Cl-36	—	1.32E-01	4.30E-01	2.01E+00	7.42E+01	—	—	—	—	—
Co-60	—	6.88E-05	2.25E-04	1.05E-03	3.88E-02	—	—	—	—	—
Ni-59	—	2.65E-03	8.68E-03	4.06E-02	1.50E+00	—	—	—	—	—
Ni-63	—	2.65E-03	8.68E-03	4.06E-02	1.50E+00	—	—	—	—	—
Sr-90	—	4.97E+00	1.62E+01	7.60E+01	2.80E+03	—	—	—	—	—
Nb-94	—	3.79E-06	1.24E-05	5.79E-05	2.14E-03	—	—	—	—	—
Tc-99	—	8.40E-04	2.75E-03	1.28E-02	4.74E-01	—	—	—	—	—
I-129	—	1.73E-06	5.67E-06	2.65E-05	9.78E-04	—	—	—	—	—
Cs-137	—	6.87E+00	2.25E+01	1.05E+02	3.87E+03	—	—	—	—	—
Eu-152	—	3.49E-04	1.14E-03	5.34E-03	1.97E-01	—	—	—	—	—
Eu-154	—	3.64E-02	1.19E-01	5.57E-01	2.05E+01	—	—	—	—	—
Pb-210	—	7.91E-12	2.59E-11	1.21E-10	4.46E-09	—	—	—	—	—
Ra-226	—	7.38E-11	2.41E-10	1.13E-09	4.16E-08	—	—	—	—	—
Ra-228	—	8.31E-15	2.72E-14	1.27E-13	4.69E-12	—	—	—	—	—
Ac-227	—	2.44E-09	7.97E-09	3.73E-08	1.38E-06	—	—	—	—	—
Th-228	—	7.17E-07	2.34E-06	1.10E-05	4.04E-04	—	—	—	—	—
Th-229	—	8.60E-11	2.81E-10	1.32E-09	4.85E-08	—	—	—	—	—
Th-230	—	3.39E-08	1.11E-07	5.18E-07	1.91E-05	—	—	—	—	—
Th-232	—	1.78E-07	5.83E-07	2.73E-06	1.01E-04	—	—	—	—	—
Pa-231	—	1.14E-08	3.74E-08	1.75E-07	6.46E-06	—	—	—	—	—

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Table B-12 (Part 4). Best-estimate inventory associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Best-estimate inventory for waste stream ANL-MOD-2H (extended data)									
Kg of HM Disposed =	—	2.79E-02	9.14E-02	4.27E-01	1.58E+01	—	—	—	—
Nuclide	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
U-232	—	7.84E-07	2.56E-06	1.20E-05	4.42E-04	—	—	—	—
U-233	—	6.36E-08	2.08E-07	9.72E-07	3.58E-05	—	—	—	—
U-234	—	4.15E-04	1.36E-03	6.34E-03	2.34E-01	—	—	—	—
U-235	—	1.69E-05	5.53E-05	2.59E-04	9.54E-03	—	—	—	—
U-236	—	2.67E-05	8.73E-05	4.08E-04	1.51E-02	—	—	—	—
U-238	—	3.25E-06	1.06E-05	4.97E-05	1.83E-03	—	—	—	—
Np-237	—	5.53E-06	1.81E-05	8.45E-05	3.12E-03	—	—	—	—
Pu-238	—	2.85E-03	9.33E-03	4.36E-02	1.61E+00	—	—	—	—
Pu-239	—	1.14E-01	3.72E-01	1.74E+00	6.42E+01	—	—	—	—
Pu-240	—	1.74E-03	5.70E-03	2.66E-02	9.82E-01	—	—	—	—
Pu-241	—	3.00E-02	9.80E-02	4.58E-01	1.69E+01	—	—	—	—
Pu-242	—	4.79E-07	1.57E-06	7.33E-06	2.70E-04	—	—	—	—
Pu-244	—	3.17E-16	1.04E-15	4.85E-15	1.79E-13	—	—	—	—
Am-241	—	7.51E-04	2.45E-03	1.15E-02	4.23E-01	—	—	—	—
Am-243	—	4.06E-07	1.33E-06	6.21E-06	2.29E-04	—	—	—	—
Cm-243	—	1.16E-07	3.78E-07	1.77E-06	6.52E-05	—	—	—	—
Cm-244	—	3.67E-06	1.20E-05	5.61E-05	2.07E-03	—	—	—	—
Cm-245	—	1.80E-10	5.88E-10	2.75E-09	1.02E-07	—	—	—	—
Cm-246	—	1.68E-12	5.50E-12	2.57E-11	9.49E-10	—	—	—	—
Cm-247	—	1.51E-18	4.95E-18	2.32E-17	8.54E-16	—	—	—	—
Cm-248	—	2.81E-19	9.20E-19	4.30E-18	1.59E-16	—	—	—	—
Totals =	—	1.23E+01	4.04E+01	1.89E+02	6.96E+03	—	—	—	—

File = "NEW fuelbearing wastes.xls"

Table B-13. Lower-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Kg of HM Disposed =	Lower-bound inventory for waste stream ANL-MOD-2H													
	1971		1972		1973		1974		1975		1976		1977	
	Nuclide	(Ci)	(Ci)	(Ci)	(Ci)									
H-3	1.11E+00	1.25E+00	4.00E-01	1.26E-01	6.15E-01	4.64E-01	2.73E-01	1.14E-01	2.17E-02	5.62E-02	8.32E-02	—	2.08E-01	
C-14	7.58E-04	8.54E-04	2.73E-04	8.57E-05	4.19E-04	3.16E-04	1.86E-04	7.75E-05	1.48E-05	3.83E-05	5.67E-05	—	1.41E-04	
Cl-36	4.68E-08	5.27E-08	1.68E-08	5.29E-09	2.59E-08	1.95E-08	1.15E-08	4.78E-09	9.14E-10	2.36E-09	3.50E-09	—	8.73E-09	
Co-60	2.17E+00	2.45E+00	7.81E-01	2.46E-01	1.20E+00	9.07E-01	5.33E-01	2.22E-01	4.25E-02	1.10E-01	1.62E-01	—	4.05E-01	
Ni-59	1.14E-03	1.28E-03	4.09E-04	1.28E-04	6.28E-04	4.74E-04	2.79E-04	1.16E-04	2.22E-05	5.73E-05	8.50E-05	—	2.12E-04	
Ni-63	2.19E-01	2.47E-01	7.88E-02	2.48E-02	1.21E-01	9.15E-02	5.38E-02	2.24E-02	4.28E-03	1.11E-02	1.64E-02	—	4.09E-02	
Sr-90	4.10E+02	4.62E+02	1.47E+02	4.64E+01	2.27E+02	1.71E+02	1.01E+02	4.19E+01	8.01E+00	2.07E+01	3.07E+01	—	7.65E+01	
Nb-94	2.08E-04	2.35E-04	7.50E-05	2.36E-05	1.15E-04	8.70E-05	5.12E-05	2.13E-05	4.07E-06	1.05E-05	1.56E-05	—	3.89E-05	
Tc-99	6.93E-02	7.81E-02	2.49E-02	7.84E-03	3.83E-02	2.89E-02	1.70E-02	7.09E-03	1.35E-03	3.50E-03	5.18E-03	—	1.29E-02	
I-129	1.43E-04	1.61E-04	5.15E-05	1.62E-05	7.91E-05	5.97E-05	3.51E-05	1.46E-05	2.80E-06	7.22E-06	1.07E-05	—	2.67E-05	
Cs-137	5.67E+02	6.39E+02	2.04E+02	6.41E+01	3.14E+02	2.37E+02	1.39E+02	5.80E+01	1.11E+01	2.86E+01	4.24E+01	—	1.06E+02	
Eu-152	1.15E-02	1.30E-02	4.14E-03	1.30E-03	6.37E-03	4.81E-03	2.83E-03	1.18E-03	2.25E-04	5.82E-04	8.62E-04	—	2.15E-03	
Eu-154	1.20E+00	1.35E+00	4.32E-01	1.36E-01	6.65E-01	5.02E-01	2.95E-01	1.23E-01	2.35E-02	6.07E-02	8.99E-02	—	2.24E-01	
Pb-210	1.31E-10	1.47E-10	4.70E-11	1.48E-11	7.22E-11	5.45E-11	3.21E-11	1.34E-11	2.55E-12	6.59E-12	9.77E-12	—	2.44E-11	
Ra-226	2.44E-09	2.75E-09	8.76E-10	2.76E-10	1.35E-09	1.02E-09	5.98E-10	2.49E-10	4.76E-11	1.23E-10	1.82E-10	—	4.55E-10	
Ra-228	6.86E-14	7.73E-14	2.47E-14	7.76E-15	3.80E-14	2.86E-14	1.68E-14	7.02E-15	1.34E-15	3.46E-15	5.13E-15	—	1.28E-14	
Ac-227	2.01E-08	2.27E-08	7.24E-09	2.28E-09	1.11E-08	8.40E-09	4.94E-09	2.06E-09	3.93E-10	1.02E-09	1.50E-09	—	3.75E-09	
Th-228	2.37E-06	2.67E-06	8.51E-07	2.68E-07	1.31E-06	9.88E-07	5.81E-07	2.42E-07	4.63E-08	1.19E-07	1.77E-07	—	4.42E-07	
Th-229	4.73E-09	5.33E-09	1.70E-09	5.35E-10	2.62E-09	1.97E-09	1.16E-09	4.84E-10	9.25E-11	2.39E-10	3.54E-10	—	8.83E-10	
Th-230	2.80E-06	3.15E-06	1.01E-06	3.16E-07	1.55E-06	1.17E-06	6.87E-07	2.86E-07	5.47E-08	1.41E-07	2.09E-07	—	5.22E-07	
Th-232	5.88E-06	6.63E-06	2.12E-06	6.66E-07	3.25E-06	2.46E-06	1.44E-06	6.02E-07	1.15E-07	2.97E-07	4.40E-07	—	1.10E-06	
Pa-231	3.78E-07	4.26E-07	1.36E-07	4.27E-08	2.09E-07	1.58E-07	9.28E-08	3.86E-08	7.39E-09	1.91E-08	2.83E-08	—	7.05E-08	

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Table B-13 (Part 2). Lower-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Kg of HM Disposed =	Lower-bound inventory for waste stream ANL-MOD-2H													
	1971 (Ci)		1972 (Ci)		1973 (Ci)		1974 (Ci)		1975 (Ci)		1976 (Ci)		1977 (Ci)	
	Nuclide													
U-232	6.47E-05	7.29E-05	2.33E-05	7.32E-06	3.58E-05	2.70E-05	1.59E-05	6.62E-06	1.26E-06	3.27E-06	4.84E-06	—	1.21E-05	
U-233	5.25E-06	5.91E-06	1.89E-06	5.93E-07	2.90E-06	2.19E-06	1.29E-06	5.36E-07	1.03E-07	2.65E-07	3.92E-07	—	9.79E-07	
U-234	3.42E-02	3.86E-02	1.23E-02	3.87E-03	1.89E-02	1.43E-02	8.40E-03	3.50E-03	6.69E-04	1.73E-03	2.56E-03	—	6.39E-03	
U-235	2.54E-03	2.86E-03	9.13E-04	2.87E-04	1.40E-03	1.06E-03	6.23E-04	2.60E-04	4.96E-05	1.28E-04	1.90E-04	—	4.74E-04	
U-236	2.20E-03	2.48E-03	7.93E-04	2.49E-04	1.22E-03	9.20E-04	5.41E-04	2.25E-04	4.31E-05	1.11E-04	1.65E-04	—	4.11E-04	
U-238	2.68E-04	3.02E-04	9.64E-05	3.03E-05	1.48E-04	1.12E-04	6.58E-05	2.74E-05	5.24E-06	1.35E-05	2.01E-05	—	5.00E-05	
Np-237	4.56E-04	5.14E-04	1.64E-04	5.16E-05	2.52E-04	1.90E-04	1.12E-04	4.66E-05	8.92E-06	2.30E-05	3.41E-05	—	8.51E-05	
Pu-238	1.57E-01	1.77E-01	5.64E-02	1.78E-02	8.68E-02	6.55E-02	3.85E-02	1.61E-02	3.07E-03	7.92E-03	1.17E-02	—	2.93E-02	
Pu-239	9.39E+00	1.06E+01	3.38E+00	1.06E+00	5.20E+00	3.92E+00	2.31E+00	9.61E-01	1.84E-01	4.74E-01	7.03E-01	—	1.75E+00	
Pu-240	2.88E-02	3.24E-02	1.03E-02	3.25E-03	1.59E-02	1.20E-02	7.06E-03	2.94E-03	5.62E-04	1.45E-03	2.15E-03	—	5.37E-03	
Pu-241	9.89E-02	1.12E-01	3.56E-02	1.12E-02	5.47E-02	4.13E-02	2.43E-02	1.01E-02	1.93E-03	4.99E-03	7.40E-03	—	1.85E-02	
Pu-242	7.91E-06	8.92E-06	2.84E-06	8.95E-07	4.37E-06	3.30E-06	1.94E-06	8.09E-07	1.55E-07	3.99E-07	5.92E-07	—	1.48E-06	
Pu-244	5.23E-15	5.89E-15	1.88E-15	5.91E-16	2.89E-15	2.18E-15	1.28E-15	5.35E-16	1.02E-16	2.64E-16	3.91E-16	—	9.76E-16	
Am-241	1.24E-02	1.40E-02	4.46E-03	1.40E-03	6.85E-03	5.17E-03	3.04E-03	1.27E-03	2.42E-04	6.25E-04	9.27E-04	—	2.31E-03	
Am-243	1.34E-06	1.51E-06	4.82E-07	1.52E-07	7.41E-07	5.59E-07	3.29E-07	1.37E-07	2.62E-08	6.76E-08	1.00E-07	—	2.50E-07	
Cm-243	3.82E-07	4.30E-07	1.37E-07	4.32E-08	2.11E-07	1.59E-07	9.37E-08	3.90E-08	7.46E-09	1.93E-08	2.85E-08	—	7.12E-08	
Cm-244	6.05E-06	6.82E-06	2.18E-06	6.85E-07	3.35E-06	2.53E-06	1.49E-06	6.19E-07	1.18E-07	3.06E-07	4.53E-07	—	1.13E-06	
Cm-245	5.94E-10	6.70E-10	2.14E-10	6.72E-11	3.29E-10	2.48E-10	1.46E-10	6.08E-11	1.16E-11	3.00E-11	4.44E-11	—	1.11E-10	
Cm-246	5.56E-12	6.26E-12	2.00E-12	6.28E-13	3.07E-12	2.32E-12	1.36E-12	5.68E-13	1.09E-13	2.80E-13	4.15E-13	—	1.04E-12	
Cm-247	1.25E-17	1.41E-17	4.50E-18	1.41E-18	6.92E-18	5.22E-18	3.07E-18	1.28E-18	2.44E-19	6.31E-19	9.35E-19	—	2.33E-18	
Cm-248	4.65E-18	5.24E-18	1.67E-18	5.26E-19	2.57E-18	1.94E-18	1.14E-18	4.75E-19	9.08E-20	2.35E-19	3.48E-19	—	8.67E-19	
Totals =	9.99E+02	1.13E+03	3.59E+02	1.13E+02	5.52E+02	4.17E+02	2.45E+02	1.02E+02	1.95E+01	5.04E+01	7.47E+01	—	1.86E+02	

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Table B-13 (Part 3). Lower-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1984 through 1993).

Lower-bound inventory for waste stream ANL-MOD-2H (extended data)										
Kg of HM Disposed =	—	2.79E-02	9.14E-02	4.27E-01	1.58E+01	—	—	—	—	—
Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)
H-3	—	6.74E-03	2.20E-02	1.03E-01	3.80E+00	—	—	—	—	—
C-14	—	4.59E-06	1.50E-05	7.02E-05	2.59E-03	—	—	—	—	—
Cl-36	—	2.83E-10	9.27E-10	4.33E-09	1.60E-07	—	—	—	—	—
Co-60	—	1.32E-02	4.30E-02	2.01E-01	7.42E+00	—	—	—	—	—
Ni-59	—	6.88E-06	2.25E-05	1.05E-04	3.88E-03	—	—	—	—	—
Ni-63	—	1.33E-03	4.34E-03	2.03E-02	7.49E-01	—	—	—	—	—
Sr-90	—	2.48E+00	8.12E+00	3.80E+01	1.40E+03	—	—	—	—	—
Nb-94	—	1.26E-06	4.13E-06	1.93E-05	7.12E-04	—	—	—	—	—
Tc-99	—	4.20E-04	1.37E-03	6.42E-03	2.37E-01	—	—	—	—	—
I-129	—	8.67E-07	2.83E-06	1.33E-05	4.89E-04	—	—	—	—	—
Cs-137	—	3.43E+00	1.12E+01	5.25E+01	1.94E+03	—	—	—	—	—
Eu-152	—	6.98E-05	2.28E-04	1.07E-03	3.94E-02	—	—	—	—	—
Eu-154	—	7.28E-03	2.38E-02	1.11E-01	4.11E+00	—	—	—	—	—
Pb-210	—	7.91E-13	2.59E-12	1.21E-11	4.46E-10	—	—	—	—	—
Ra-226	—	1.48E-11	4.83E-11	2.26E-10	8.33E-09	—	—	—	—	—
Ra-228	—	4.16E-16	1.36E-15	6.36E-15	2.34E-13	—	—	—	—	—
Ac-227	—	1.22E-10	3.99E-10	1.86E-09	6.88E-08	—	—	—	—	—
Th-228	—	1.43E-08	4.69E-08	2.19E-07	8.09E-06	—	—	—	—	—
Th-229	—	2.87E-11	9.37E-11	4.38E-10	1.62E-08	—	—	—	—	—
Th-230	—	1.69E-08	5.54E-08	2.59E-07	9.56E-06	—	—	—	—	—
Th-232	—	3.56E-08	1.17E-07	5.45E-07	2.01E-05	—	—	—	—	—
Pa-231	—	2.29E-09	7.49E-09	3.50E-08	1.29E-06	—	—	—	—	—

Table B-13 (Part 4). Lower-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1984 through 1993).

Lower-bound inventory for waste stream ANL-MOD-2H (extended data)										
Kg of HM Disposed =	—	2.79E-02	9.14E-02	4.27E-01	1.58E+01	—	—	—	—	—
Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)
U-232	—	3.92E-07	1.28E-06	5.99E-06	2.21E-04	—	—	—	—	—
U-233	—	3.18E-08	1.04E-07	4.86E-07	1.79E-05	—	—	—	—	—
U-234	—	2.07E-04	6.78E-04	3.17E-03	1.17E-01	—	—	—	—	—
U-235	—	1.54E-05	5.03E-05	2.35E-04	8.67E-03	—	—	—	—	—
U-236	—	1.34E-05	4.37E-05	2.04E-04	7.53E-03	—	—	—	—	—
U-238	—	1.62E-06	5.31E-06	2.48E-05	9.16E-04	—	—	—	—	—
Np-237	—	2.76E-06	9.04E-06	4.23E-05	1.56E-03	—	—	—	—	—
Pu-238	—	9.51E-04	3.11E-03	1.45E-02	5.36E-01	—	—	—	—	—
Pu-239	—	5.69E-02	1.86E-01	8.70E-01	3.21E+01	—	—	—	—	—
Pu-240	—	1.74E-04	5.70E-04	2.66E-03	9.82E-02	—	—	—	—	—
Pu-241	—	5.99E-04	1.96E-03	9.17E-03	3.38E-01	—	—	—	—	—
Pu-242	—	4.79E-08	1.57E-07	7.33E-07	2.70E-05	—	—	—	—	—
Pu-244	—	3.17E-17	1.04E-16	4.85E-16	1.79E-14	—	—	—	—	—
Am-241	—	7.51E-05	2.45E-04	1.15E-03	4.23E-02	—	—	—	—	—
Am-243	—	8.12E-09	2.65E-08	1.24E-07	4.58E-06	—	—	—	—	—
Cm-243	—	2.31E-09	7.56E-09	3.53E-08	1.30E-06	—	—	—	—	—
Cm-244	—	3.67E-08	1.20E-07	5.61E-07	2.07E-05	—	—	—	—	—
Cm-245	—	3.60E-12	1.18E-11	5.50E-11	2.03E-09	—	—	—	—	—
Cm-246	—	3.36E-14	1.10E-13	5.15E-13	1.90E-11	—	—	—	—	—
Cm-247	—	7.57E-20	2.48E-19	1.16E-18	4.27E-17	—	—	—	—	—
Cm-248	—	2.81E-20	9.20E-20	4.30E-19	1.59E-17	—	—	—	—	—
Totals =	—	6.05E+00	1.98E+01	9.25E+01	3.41E+03	—	—	—	—	—

File = "NEW fuelbearing wastes.xls"

Table B-14. Upper-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Kg of HM Disposed =	Upper-bound inventory for waste stream ANL-MOD-2H													
	1971		1972		1973		1974		1975		1976		1977	
	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
H-3	2.78E+01	3.14E+01	1.00E+01	3.15E+00	1.54E+01	1.16E+01	6.83E+00	2.84E+00	5.44E-01	1.40E+00	2.08E+00	—	5.19E+00	
C-14	1.89E-02	2.14E-02	6.81E-03	2.14E-03	1.05E-02	7.91E-03	4.65E-03	1.94E-03	3.70E-04	9.56E-04	1.42E-03	—	3.54E-03	
Cl-36	4.68E-04	5.27E-04	1.68E-04	5.29E-05	2.59E-04	1.95E-04	1.15E-04	4.78E-05	9.14E-06	2.36E-05	3.50E-05	—	8.73E-05	
Co-60	2.17E+02	2.45E+02	7.81E+01	2.46E+01	1.20E+02	9.07E+01	5.33E+01	2.22E+01	4.25E+00	1.10E+01	1.62E+01	—	4.05E+01	
Ni-59	1.14E-01	1.28E-01	4.09E-02	1.28E-02	6.28E-02	4.74E-02	2.79E-02	1.16E-02	2.22E-03	5.73E-03	8.50E-03	—	2.12E-02	
Ni-63	8.76E-01	9.88E-01	3.15E-01	9.91E-02	4.85E-01	3.66E-01	2.15E-01	8.96E-02	1.71E-02	4.42E-02	6.55E-02	—	1.64E-01	
Sr-90	1.64E+03	1.85E+03	5.90E+02	1.85E+02	9.07E+02	6.84E+02	4.03E+02	1.68E+02	3.20E+01	8.28E+01	1.23E+02	—	3.06E+02	
Nb-94	1.88E-03	2.11E-03	6.75E-04	2.12E-04	1.04E-03	7.83E-04	4.61E-04	1.92E-04	3.67E-05	9.47E-05	1.40E-04	—	3.50E-04	
Tc-99	2.77E-01	3.13E-01	9.97E-02	3.14E-02	1.53E-01	1.16E-01	6.81E-02	2.84E-02	5.42E-03	1.40E-02	2.07E-02	—	5.17E-02	
I-129	5.72E-04	6.45E-04	2.06E-04	6.47E-05	3.17E-04	2.39E-04	1.41E-04	5.85E-05	1.12E-05	2.89E-05	4.28E-05	—	1.07E-04	
Cs-137	2.27E+03	2.56E+03	8.16E+02	2.57E+02	1.25E+03	9.47E+02	5.57E+02	2.32E+02	4.43E+01	1.14E+02	1.70E+02	—	4.23E+02	
Eu-152	2.88E-01	3.25E-01	1.04E-01	3.26E-02	1.59E-01	1.20E-01	7.07E-02	2.95E-02	5.63E-03	1.45E-02	2.15E-02	—	5.37E-02	
Eu-154	3.01E+01	3.39E+01	1.08E+01	3.40E+00	1.66E+01	1.25E+01	7.38E+00	3.07E+00	5.87E-01	1.52E+00	2.25E+00	—	5.61E+00	
Pb-210	1.31E-08	1.47E-08	4.70E-09	1.48E-09	7.22E-09	5.45E-09	3.21E-09	1.34E-09	2.55E-10	6.59E-10	9.77E-10	—	2.44E-09	
Ra-226	6.09E-08	6.87E-08	2.19E-08	6.89E-09	3.37E-08	2.54E-08	1.50E-08	6.23E-09	1.19E-09	3.07E-09	4.56E-09	—	1.14E-08	
Ra-228	2.74E-11	3.09E-11	9.87E-12	3.10E-12	1.52E-11	1.15E-11	6.74E-12	2.81E-12	5.36E-13	1.39E-12	2.05E-12	—	5.12E-12	
Ac-227	8.05E-06	9.07E-06	2.89E-06	9.10E-07	4.45E-06	3.36E-06	1.98E-06	8.23E-07	1.57E-07	4.06E-07	6.02E-07	—	1.50E-06	
Th-228	5.92E-03	6.67E-03	2.13E-03	6.69E-04	3.27E-03	2.47E-03	1.45E-03	6.05E-04	1.16E-04	2.99E-04	4.43E-04	—	1.10E-03	
Th-229	4.26E-08	4.80E-08	1.53E-08	4.82E-09	2.36E-08	1.78E-08	1.05E-08	4.35E-09	8.32E-10	2.15E-09	3.19E-09	—	7.95E-09	
Th-230	1.12E-05	1.26E-05	4.02E-06	1.27E-06	6.19E-06	4.67E-06	2.75E-06	1.14E-06	2.19E-07	5.65E-07	8.37E-07	—	2.09E-06	
Th-232	1.47E-04	1.66E-04	5.29E-05	1.66E-05	8.14E-05	6.14E-05	3.61E-05	1.50E-05	2.88E-06	7.43E-06	1.10E-05	—	2.74E-05	
Pa-231	9.45E-06	1.06E-05	3.40E-06	1.07E-06	5.23E-06	3.94E-06	2.32E-06	9.66E-07	1.85E-07	4.77E-07	7.07E-07	—	1.76E-06	

Table B-14 (Part 2). Upper-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Kg of HM Disposed =	Upper-bound inventory for waste stream ANL-MOD-2H													
	1971 (Ci)		1972 (Ci)		1973 (Ci)		1974 (Ci)		1975 (Ci)		1976 (Ci)		1977 (Ci)	
	Nuclide													
U-232	2.59E-04	2.92E-04	9.31E-05	2.93E-05	1.43E-04	1.08E-04	6.36E-05	2.65E-05	5.06E-06	1.31E-05	1.94E-05	—	4.83E-05	
U-233	2.10E-05	2.37E-05	7.55E-06	2.37E-06	1.16E-05	8.76E-06	5.15E-06	2.15E-06	4.10E-07	1.06E-06	1.57E-06	—	3.92E-06	
U-234	1.37E-01	1.54E-01	4.92E-02	1.55E-02	7.57E-02	5.71E-02	3.36E-02	1.40E-02	2.68E-03	6.91E-03	1.02E-02	—	2.55E-02	
U-235	3.07E-03	3.46E-03	1.10E-03	3.47E-04	1.70E-03	1.28E-03	7.54E-04	3.14E-04	6.00E-05	1.55E-04	2.30E-04	—	5.73E-04	
U-236	8.82E-03	9.94E-03	3.17E-03	9.97E-04	4.88E-03	3.68E-03	2.16E-03	9.02E-04	1.72E-04	4.45E-04	6.59E-04	—	1.65E-03	
U-238	1.07E-03	1.21E-03	3.86E-04	1.21E-04	5.93E-04	4.48E-04	2.63E-04	1.10E-04	2.10E-05	5.41E-05	8.02E-05	—	2.00E-04	
Np-237	1.82E-03	2.06E-03	6.56E-04	2.06E-04	1.01E-03	7.62E-04	4.48E-04	1.87E-04	3.57E-05	9.21E-05	1.36E-04	—	3.40E-04	
Pu-238	1.41E+00	1.59E+00	5.08E-01	1.60E-01	7.81E-01	5.90E-01	3.47E-01	1.44E-01	2.76E-02	7.13E-02	1.06E-01	—	2.64E-01	
Pu-239	3.76E+01	4.24E+01	1.35E+01	4.25E+00	2.08E+01	1.57E+01	9.23E+00	3.84E+00	7.34E-01	1.90E+00	2.81E+00	—	7.01E+00	
Pu-240	2.88E+00	3.24E+00	1.03E+00	3.25E-01	1.59E+00	1.20E+00	7.06E-01	2.94E-01	5.62E-02	1.45E-01	2.15E-01	—	5.37E-01	
Pu-241	2.47E+02	2.79E+02	8.90E+01	2.80E+01	1.37E+02	1.03E+02	6.07E+01	2.53E+01	4.83E+00	1.25E+01	1.85E+01	—	4.62E+01	
Pu-242	7.91E-04	8.92E-04	2.84E-04	8.95E-05	4.37E-04	3.30E-04	1.94E-04	8.09E-05	1.55E-05	3.99E-05	5.92E-05	—	1.48E-04	
Pu-244	5.23E-13	5.89E-13	1.88E-13	5.91E-14	2.89E-13	2.18E-13	1.28E-13	5.35E-14	1.02E-14	2.64E-14	3.91E-14	—	9.76E-14	
Am-241	1.24E+00	1.40E+00	4.46E-01	1.40E-01	6.85E-01	5.17E-01	3.04E-01	1.27E-01	2.42E-02	6.25E-02	9.27E-02	—	2.31E-01	
Am-243	3.35E-03	3.78E-03	1.20E-03	3.79E-04	1.85E-03	1.40E-03	8.22E-04	3.43E-04	6.55E-05	1.69E-04	2.51E-04	—	6.25E-04	
Cm-243	9.54E-04	1.08E-03	3.43E-04	1.08E-04	5.28E-04	3.98E-04	2.34E-04	9.75E-05	1.86E-05	4.81E-05	7.13E-05	—	1.78E-04	
Cm-244	6.05E-02	6.82E-02	2.18E-02	6.85E-03	3.35E-02	2.53E-02	1.49E-02	6.19E-03	1.18E-03	3.06E-03	4.53E-03	—	1.13E-02	
Cm-245	1.49E-06	1.67E-06	5.34E-07	1.68E-07	8.22E-07	6.20E-07	3.65E-07	1.52E-07	2.90E-08	7.50E-08	1.11E-07	—	2.77E-07	
Cm-246	1.39E-08	1.57E-08	4.99E-09	1.57E-09	7.68E-09	5.80E-09	3.41E-09	1.42E-09	2.71E-10	7.01E-10	1.04E-09	—	2.59E-09	
Cm-247	5.00E-15	5.64E-15	1.80E-15	5.66E-16	2.77E-15	2.09E-15	1.23E-15	5.11E-16	9.77E-17	2.52E-16	3.74E-16	—	9.33E-16	
Cm-248	4.65E-16	5.24E-16	1.67E-16	5.26E-17	2.57E-16	1.94E-16	1.14E-16	4.75E-17	9.08E-18	2.35E-17	3.48E-17	—	8.67E-17	
Totals =	4.49E+03	5.06E+03	1.61E+03	5.08E+02	2.48E+03	1.87E+03	1.10E+03	4.59E+02	8.78E+01	2.27E+02	3.36E+02	—	8.38E+02	

Table B-14 (Part 3). Upper-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Upper-bound inventory for waste stream ANL-MOD-2H (extended data)										
Kg of HM Disposed =	—	2.79E-02	9.14E-02	4.27E-01	1.58E+01	—	—	—	—	—
Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)
H-3	—	1.68E-01	5.51E-01	2.58E+00	9.50E+01	—	—	—	—	—
C-14	—	1.15E-04	3.75E-04	1.76E-03	6.47E-02	—	—	—	—	—
Cl-36	—	2.83E-06	9.27E-06	4.33E-05	1.60E-03	—	—	—	—	—
Co-60	—	1.32E+00	4.30E+00	2.01E+01	7.42E+02	—	—	—	—	—
Ni-59	—	6.88E-04	2.25E-03	1.05E-02	3.88E-01	—	—	—	—	—
Ni-63	—	5.31E-03	1.74E-02	8.12E-02	2.99E+00	—	—	—	—	—
Sr-90	—	9.93E+00	3.25E+01	1.52E+02	5.60E+03	—	—	—	—	—
Nb-94	—	1.14E-05	3.72E-05	1.74E-04	6.41E-03	—	—	—	—	—
Tc-99	—	1.68E-03	5.49E-03	2.57E-02	9.47E-01	—	—	—	—	—
I-129	—	3.47E-06	1.13E-05	5.30E-05	1.96E-03	—	—	—	—	—
Cs-137	—	1.37E+01	4.49E+01	2.10E+02	7.75E+03	—	—	—	—	—
Eu-152	—	1.74E-03	5.71E-03	2.67E-02	9.84E-01	—	—	—	—	—
Eu-154	—	1.82E-01	5.95E-01	2.78E+00	1.03E+02	—	—	—	—	—
Pb-210	—	7.91E-11	2.59E-10	1.21E-09	4.46E-08	—	—	—	—	—
Ra-226	—	3.69E-10	1.21E-09	5.64E-09	2.08E-07	—	—	—	—	—
Ra-228	—	1.66E-13	5.44E-13	2.54E-12	9.38E-11	—	—	—	—	—
Ac-227	—	4.87E-08	1.59E-07	7.46E-07	2.75E-05	—	—	—	—	—
Th-228	—	3.58E-05	1.17E-04	5.48E-04	2.02E-02	—	—	—	—	—
Th-229	—	2.58E-10	8.44E-10	3.95E-09	1.45E-07	—	—	—	—	—
Th-230	—	6.78E-08	2.22E-07	1.04E-06	3.82E-05	—	—	—	—	—
Th-232	—	8.91E-07	2.91E-06	1.36E-05	5.03E-04	—	—	—	—	—
Pa-231	—	5.72E-08	1.87E-07	8.75E-07	3.23E-05	—	—	—	—	—

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Table B-14 (Part 4). Upper-bound activity associated with fuel-bearing wastes in ANL-MOD-2H (1971 through 1993).

Upper-bound inventory for waste stream ANL-MOD-2H (extended data)									
Kg of HM Disposed =	—	2.79E-02	9.14E-02	4.27E-01	1.58E+01	—	—	—	—
Nuclide	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
U-232	—	1.57E-06	5.13E-06	2.40E-05	8.84E-04	—	—	—	—
U-233	—	1.27E-07	4.16E-07	1.94E-06	7.17E-05	—	—	—	—
U-234	—	8.29E-04	2.71E-03	1.27E-02	4.68E-01	—	—	—	—
U-235	—	1.86E-05	6.08E-05	2.85E-04	1.05E-02	—	—	—	—
U-236	—	5.34E-05	1.75E-04	8.17E-04	3.01E-02	—	—	—	—
U-238	—	6.50E-06	2.12E-05	9.93E-05	3.66E-03	—	—	—	—
Np-237	—	1.11E-05	3.61E-05	1.69E-04	6.23E-03	—	—	—	—
Pu-238	—	8.56E-03	2.80E-02	1.31E-01	4.83E+00	—	—	—	—
Pu-239	—	2.28E-01	7.44E-01	3.48E+00	1.28E+02	—	—	—	—
Pu-240	—	1.74E-02	5.70E-02	2.66E-01	9.82E+00	—	—	—	—
Pu-241	—	1.50E+00	4.90E+00	2.29E+01	8.45E+02	—	—	—	—
Pu-242	—	4.79E-06	1.57E-05	7.33E-05	2.70E-03	—	—	—	—
Pu-244	—	3.17E-15	1.04E-14	4.85E-14	1.79E-12	—	—	—	—
Am-241	—	7.51E-03	2.45E-02	1.15E-01	4.23E+00	—	—	—	—
Am-243	—	2.03E-05	6.63E-05	3.10E-04	1.14E-02	—	—	—	—
Cm-243	—	5.78E-06	1.89E-05	8.84E-05	3.26E-03	—	—	—	—
Cm-244	—	3.67E-04	1.20E-03	5.61E-03	2.07E-01	—	—	—	—
Cm-245	—	9.00E-09	2.94E-08	1.38E-07	5.08E-06	—	—	—	—
Cm-246	—	8.41E-11	2.75E-10	1.29E-09	4.74E-08	—	—	—	—
Cm-247	—	3.03E-17	9.91E-17	4.63E-16	1.71E-14	—	—	—	—
Cm-248	—	2.81E-18	9.20E-18	4.30E-17	1.59E-15	—	—	—	—
Totals =	—	2.72E+01	8.89E+01	4.16E+02	1.53E+04	—	—	—	—

File = "NEW fuelbearing wastes.xls"

B-4. FISSION AND ACTINIDE WASTES SENT TO THE SOIL VAULTS FROM 1977 THROUGH 1993

The fission and actinide wastes sent to the soil vaults from 1977 through 1993 are included in the ANL-MOD-3R waste stream. These wastes include significant, but not large quantities of Cs-137 with small amounts of actinides. Since Cs-137 was usually present with all of these wastes, then significant quantities of other fission products should also exist in this waste stream, although these other fission products were generally not reported on the waste shipment forms. These other radionuclides were probably not reported because they were generally hard to detect. For example, some radionuclides have long half-lives (e.g., I-129 at 16 million years) and therefore do not decay frequently enough to be detected. Some radionuclides decay in processes that do not lead to a detectable gamma-ray; H-3, C-14, Cl-36, Ni-59, Ni-63, and Sr-90 all decay by beta emission (i.e., no gamma-ray), or Tc-99, which decays with the release of a weak gamma-ray. Some may exist in only small concentrations (due to a small fission yield) that makes it difficult to detect these radionuclides in solid waste items (e.g., a piece of steel) when more energetic radionuclides (e.g., Co-60 and Cs-137) are present. Also, at the time when these wastes were being discarded, the primary reason for identifying any radionuclides on the shipping manifest was to protect personnel that were working with these wastes. For example, C-14 would not affect personnel handling structural components, but Co-60 and Cs-137 would. Therefore, Co-60 and Cs-137 would normally be reported, but many other less important radioisotopes would not be listed. However, reporting habits did evolve in time and more radionuclides were eventually listed on later shipping forms.

In any case, to determine the inventory of radionuclides that were probably present in the ANL-MOD-3R waste stream, but were generally not reported on the shipping manifests, it was necessary to use scaling factors (computed relative to Cs-137) and the time-dependent inventory of Cs-137 to estimate the inventory of these other “nearly invisible” radionuclides. The best-estimate inventory was determined by multiplying the best-estimate scaling factors shown in Table B-7 by the best-estimate (time-dependent) Cs-137 activity. Likewise, to determine the lower-bound inventory, the lower-bound scaling factors were multiplied by the best-estimate Cs-137 activity. And finally, the upper-bound inventory was determined by multiplying the upper-bound scaling factors shown in Table B-8 by the best-estimate Cs-137 activity.

Next, the best-estimate time-dependent inventory of Cs-137 was determined from INEEL records and was based on three components: (1) the reported inventory of Cs-137, (2) 25% of the reported curies of MFP (mixed fission products), and (3) 25% of the reported curies of the unidentified beta+gamma (UNID B+G) inventory. In other words, for wastes shipped from 1971 through 1993:

$$\text{Best-estimate Cs-137 activity} = \text{Reported Cs-137} + 25\% \bullet [\text{MFP} + \text{UNID:B+G}] \quad (1971-1993).$$

A fraction of the reported MFP and UNID:B+G activities are included with the reported Cs-137 activity. This was done because some of the Cs-137 activity may not have been explicitly accounted for on all of the Form 110 shipping records, but rather was simply included in items called MFP or UNID:B+G. The 25% factor was selected based on engineering judgment. Note that the above formula only applies to times when explicit radionuclide data were reported; for example, from 1971 through 1993 when RWMIS data are available. Before 1971, explicit radionuclide data was usually not available. Therefore, before 1971 a best-estimate Cs-137 was estimated using the alternative formula:

$$\text{Best-estimate Cs-137 activity (Ci)} = 25\% \bullet [\text{Total gross gamma activity (Ci)}] \quad (1960-1970).$$

The best-estimate inventories for the ANL-MOD-3R waste stream (1977–1993) are shown in Table B-15. The corresponding lower-bound and upper-bound inventories for ANL-MOD-3R are shown in Tables B-16 and B-17, respectively. Note that the table values were created by multiplying the Cs-137 activity (shown at the top of each table) by the corresponding scaling factor data for each radionuclide (shown in Column 2 of the first part of each table). For, example, the H-3 inventory for 1978 is computed as follows: $4.92\text{E-}03 \text{ (Ci of H-3/Ci of Cs-137)} \bullet 114.663 \text{ Ci of Cs-137} = 5.64\text{E-}01$. However, the table value is listed as $5.63\text{E-}01$. The reason for this small difference is based on the fact that the table values were calculated in spreadsheets to more than three digits of accuracy. Although the table values were printed to three significant digits, in actual practice only two significant digits can be justified.

Table B-15. Best-estimate inventory for waste stream ANL-MOD-3R (1977 through 1993).

	BE Cs-137 Ci =	2.250	114.663	35.780	16.688	15.416	8.567	203.468	159.380
Best-estimate Scaling Factor		1977	1978	1979	1980	1981	1982	1983	1984
Nuclide	(Ci/Cs-137)	(Ci)							
H-3	4.92E-03	1.10E-02	5.63E-01	1.76E-01	8.19E-02	7.56E-02	4.20E-02	9.98E-01	7.82E-01
C-14	3.34E-06	7.52E-06	3.83E-04	1.20E-04	5.58E-05	5.15E-05	2.86E-05	6.80E-04	5.33E-04
Cl-36	4.12E-09	9.28E-09	4.73E-07	1.48E-07	6.88E-08	6.36E-08	3.53E-08	8.39E-07	6.57E-07
Co-60	1.91E-02	4.31E-02	2.20E+00	6.85E-01	3.20E-01	2.95E-01	1.64E-01	3.90E+00	3.05E+00
Ni-59	1.00E-05	2.25E-05	1.15E-03	3.58E-04	1.67E-04	1.54E-04	8.58E-05	2.04E-03	1.60E-03
Ni-63	3.86E-04	8.69E-04	4.43E-02	1.38E-02	6.45E-03	5.96E-03	3.31E-03	7.86E-02	6.16E-02
Sr-90	7.23E-01	1.63E+00	8.29E+01	2.59E+01	1.21E+01	1.11E+01	6.19E+00	1.47E+02	1.15E+02
Nb-94	5.51E-07	1.24E-06	6.32E-05	1.97E-05	9.20E-06	8.50E-06	4.72E-06	1.12E-04	8.79E-05
Tc-99	1.22E-04	2.75E-04	1.40E-02	4.37E-03	2.04E-03	1.88E-03	1.05E-03	2.49E-02	1.95E-02
I-129	2.52E-07	5.68E-07	2.89E-05	9.03E-06	4.21E-06	3.89E-06	2.16E-06	5.13E-05	4.02E-05
Cs-137	1.00E+00	2.25E+00	1.15E+02	3.58E+01	1.67E+01	1.54E+01	8.57E+00	2.03E+02	1.59E+02
Eu-152	5.08E-05	1.14E-04	5.82E-03	1.82E-03	8.48E-04	7.83E-04	4.35E-04	1.03E-02	8.10E-03
Eu-154	5.30E-03	1.19E-02	6.08E-01	1.90E-01	8.84E-02	8.17E-02	4.54E-02	1.08E+00	8.45E-01
Pb-210	1.15E-12	2.59E-12	1.32E-10	4.12E-11	1.92E-11	1.78E-11	9.87E-12	2.34E-10	1.84E-10
Ra-226	1.07E-11	2.42E-11	1.23E-09	3.84E-10	1.79E-10	1.66E-10	9.20E-11	2.19E-09	1.71E-09
Ra-228	1.21E-15	2.72E-15	1.39E-13	4.33E-14	2.02E-14	1.87E-14	1.04E-14	2.46E-13	1.93E-13
Ac-227	3.55E-10	7.98E-10	4.07E-08	1.27E-08	5.92E-09	5.47E-09	3.04E-09	7.22E-08	5.66E-08
Th-228	1.04E-07	2.35E-07	1.20E-05	3.73E-06	1.74E-06	1.61E-06	8.94E-07	2.12E-05	1.66E-05
Th-229	1.25E-11	2.82E-11	1.44E-09	4.48E-10	2.09E-10	1.93E-10	1.07E-10	2.55E-09	1.99E-09
Th-230	4.93E-09	1.11E-08	5.66E-07	1.77E-07	8.23E-08	7.61E-08	4.23E-08	1.00E-06	7.86E-07
Th-232	2.60E-08	5.84E-08	2.97E-06	9.28E-07	4.33E-07	4.00E-07	2.22E-07	5.28E-06	4.13E-06
Pa-231	1.67E-09	3.75E-09	1.91E-07	5.96E-08	2.78E-08	2.57E-08	1.43E-08	3.39E-07	2.66E-07
U-232	1.14E-07	2.57E-07	1.31E-05	4.08E-06	1.90E-06	1.76E-06	9.78E-07	2.32E-05	1.82E-05
U-233	9.25E-09	2.08E-08	1.06E-06	3.31E-07	1.54E-07	1.43E-07	7.93E-08	1.88E-06	1.47E-06
U-234	6.04E-05	1.36E-04	6.92E-03	2.16E-03	1.01E-03	9.31E-04	5.17E-04	1.23E-02	9.62E-03
U-235	2.46E-06	5.54E-06	2.82E-04	8.81E-05	4.11E-05	3.80E-05	2.11E-05	5.01E-04	3.92E-04
U-236	3.89E-06	8.75E-06	4.46E-04	1.39E-04	6.49E-05	5.99E-05	3.33E-05	7.91E-04	6.20E-04
U-238	4.73E-07	1.06E-06	5.42E-05	1.69E-05	7.89E-06	7.29E-06	4.05E-06	9.62E-05	7.54E-05
Np-237	8.04E-07	1.81E-06	9.22E-05	2.88E-05	1.34E-05	1.24E-05	6.89E-06	1.64E-04	1.28E-04
Pu-238	4.15E-04	9.34E-04	4.76E-02	1.49E-02	6.93E-03	6.40E-03	3.56E-03	8.45E-02	6.62E-02
Pu-239	1.66E-02	3.73E-02	1.90E+00	5.93E-01	2.76E-01	2.55E-01	1.42E-01	3.37E+00	2.64E+00
Pu-240	2.54E-04	5.71E-04	2.91E-02	9.07E-03	4.23E-03	3.91E-03	2.17E-03	5.16E-02	4.04E-02
Pu-241	4.36E-03	9.81E-03	5.00E-01	1.56E-01	7.28E-02	6.72E-02	3.74E-02	8.88E-01	6.95E-01
Pu-242	6.97E-08	1.57E-07	8.00E-06	2.50E-06	1.16E-06	1.08E-06	5.98E-07	1.42E-05	1.11E-05
Pu-244	4.61E-17	1.04E-16	5.29E-15	1.65E-15	7.70E-16	7.11E-16	3.95E-16	9.38E-15	7.35E-15
Am-241	1.09E-04	2.46E-04	1.25E-02	3.91E-03	1.82E-03	1.68E-03	9.36E-04	2.22E-02	1.74E-02
Am-243	5.91E-08	1.33E-07	6.77E-06	2.11E-06	9.86E-07	9.11E-07	5.06E-07	1.20E-05	9.41E-06
Cm-243	1.68E-08	3.79E-08	1.93E-06	6.02E-07	2.81E-07	2.59E-07	1.44E-07	3.42E-06	2.68E-06
Cm-244	5.34E-07	1.20E-06	6.12E-05	1.91E-05	8.91E-06	8.23E-06	4.57E-06	1.09E-04	8.51E-05
Cm-245	2.62E-11	5.89E-11	3.00E-09	9.37E-10	4.37E-10	4.04E-10	2.24E-10	5.33E-09	4.18E-09
Cm-246	2.45E-13	5.51E-13	2.81E-11	8.76E-12	4.09E-12	3.78E-12	2.10E-12	4.98E-11	3.90E-11
Cm-247	2.21E-19	4.96E-19	2.53E-17	7.89E-18	3.68E-18	3.40E-18	1.89E-18	4.49E-17	3.51E-17
Cm-248	4.10E-20	9.22E-20	4.70E-18	1.47E-18	6.84E-19	6.32E-19	3.51E-19	8.34E-18	6.53E-18
Totals =		4.04E+00	2.06E+02	6.43E+01	3.00E+01	2.77E+01	1.54E+01	3.66E+02	2.86E+02

Table B-15 (Part 2). Best-estimate inventory for waste stream ANL-MOD-3R (1977 through 1993).

Cs-137 Ci =	19.472	54.400	2.400	2.400	2.400	0.000	0.000	18.098	0.00076
Nuclide	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)
H-3	9.55E-02	2.67E-01	1.18E-02	1.18E-02	1.18E-02	—	—	8.88E-02	3.73E-07
C-14	6.51E-05	1.82E-04	8.02E-06	8.02E-06	8.02E-06	—	—	6.05E-05	2.54E-10
Cl-36	8.03E-08	2.24E-07	9.90E-09	9.90E-09	9.90E-09	—	—	7.46E-08	3.13E-13
Co-60	3.73E-01	1.04E+00	4.60E-02	4.60E-02	4.60E-02	—	—	3.47E-01	1.46E-06
Ni-59	1.95E-04	5.45E-04	2.40E-05	2.40E-05	2.40E-05	—	—	1.81E-04	7.61E-10
Ni-63	7.52E-03	2.10E-02	9.27E-04	9.27E-04	9.27E-04	—	—	6.99E-03	2.94E-08
Sr-90	1.41E+01	3.93E+01	1.74E+00	1.74E+00	1.74E+00	—	—	1.31E+01	5.49E-05
Nb-94	1.07E-05	3.00E-05	1.32E-06	1.32E-06	1.32E-06	—	—	9.98E-06	4.19E-11
Tc-99	2.38E-03	6.65E-03	2.93E-04	2.93E-04	2.93E-04	—	—	2.21E-03	9.29E-09
I-129	4.91E-06	1.37E-05	6.06E-07	6.06E-07	6.06E-07	—	—	4.57E-06	1.92E-11
Cs-137	1.95E+01	5.44E+01	2.40E+00	2.40E+00	2.40E+00	—	—	1.81E+01	7.60E-05
Eu-152	9.89E-04	2.76E-03	1.22E-04	1.22E-04	1.22E-04	—	—	9.19E-04	3.86E-09
Eu-154	1.03E-01	2.88E-01	1.27E-02	1.27E-02	1.27E-02	—	—	9.59E-02	4.03E-07
Pb-210	2.24E-11	6.26E-11	2.76E-12	2.76E-12	2.76E-12	—	—	2.08E-11	8.75E-17
Ra-226	2.09E-10	5.84E-10	2.58E-11	2.58E-11	2.58E-11	—	—	1.94E-10	8.16E-16
Ra-228	2.36E-14	6.58E-14	2.90E-15	2.90E-15	2.90E-15	—	—	2.19E-14	9.20E-20
Ac-227	6.91E-09	1.93E-08	8.52E-10	8.52E-10	8.52E-10	—	—	6.42E-09	2.70E-14
Th-228	2.03E-06	5.68E-06	2.50E-07	2.50E-07	2.50E-07	—	—	1.89E-06	7.93E-12
Th-229	2.44E-10	6.81E-10	3.00E-11	3.00E-11	3.00E-11	—	—	2.27E-10	9.51E-16
Th-230	9.61E-08	2.68E-07	1.18E-08	1.18E-08	1.18E-08	—	—	8.93E-08	3.75E-13
Th-232	5.05E-07	1.41E-06	6.23E-08	6.23E-08	6.23E-08	—	—	4.70E-07	1.97E-12
Pa-231	3.24E-08	9.06E-08	4.00E-09	4.00E-09	4.00E-09	—	—	3.02E-08	1.27E-13
U-232	2.22E-06	6.21E-06	2.74E-07	2.74E-07	2.74E-07	—	—	2.07E-06	8.67E-12
U-233	1.80E-07	5.03E-07	2.22E-08	2.22E-08	2.22E-08	—	—	1.67E-07	7.03E-13
U-234	1.18E-03	3.28E-03	1.45E-04	1.45E-04	1.45E-04	—	—	1.09E-03	4.59E-09
U-235	4.79E-05	1.34E-04	5.91E-06	5.91E-06	5.91E-06	—	—	4.46E-05	1.87E-10
U-236	7.57E-05	2.11E-04	9.33E-06	9.33E-06	9.33E-06	—	—	7.04E-05	2.95E-10
U-238	9.21E-06	2.57E-05	1.13E-06	1.13E-06	1.13E-06	—	—	8.56E-06	3.59E-11
Np-237	1.57E-05	4.38E-05	1.93E-06	1.93E-06	1.93E-06	—	—	1.46E-05	6.11E-11
Pu-238	8.08E-03	2.26E-02	9.97E-04	9.97E-04	9.97E-04	—	—	7.51E-03	3.16E-08
Pu-239	3.23E-01	9.01E-01	3.98E-02	3.98E-02	3.98E-02	—	—	3.00E-01	1.26E-06
Pu-240	4.94E-03	1.38E-02	6.09E-04	6.09E-04	6.09E-04	—	—	4.59E-03	1.93E-08
Pu-241	8.49E-02	2.37E-01	1.05E-02	1.05E-02	1.05E-02	—	—	7.89E-02	3.32E-07
Pu-242	1.36E-06	3.79E-06	1.67E-07	1.67E-07	1.67E-07	—	—	1.26E-06	5.30E-12
Pu-244	8.98E-16	2.51E-15	1.11E-16	1.11E-16	1.11E-16	—	—	8.35E-16	3.50E-21
Am-241	2.13E-03	5.94E-03	2.62E-04	2.62E-04	2.62E-04	—	—	1.98E-03	8.30E-09
Am-243	1.15E-06	3.21E-06	1.42E-07	1.42E-07	1.42E-07	—	—	1.07E-06	4.49E-12
Cm-243	3.28E-07	9.15E-07	4.04E-08	4.04E-08	4.04E-08	—	—	3.04E-07	1.28E-12
Cm-244	1.04E-05	2.90E-05	1.28E-06	1.28E-06	1.28E-06	—	—	9.66E-06	4.06E-11
Cm-245	5.10E-10	1.43E-09	6.29E-11	6.29E-11	6.29E-11	—	—	4.74E-10	1.99E-15
Cm-246	4.77E-12	1.33E-11	5.88E-13	5.88E-13	5.88E-13	—	—	4.43E-12	1.86E-17
Cm-247	4.29E-18	1.20E-17	5.29E-19	5.29E-19	5.29E-19	—	—	3.99E-18	1.68E-23
Cm-248	7.98E-19	2.23E-18	9.83E-20	9.83E-20	9.83E-20	—	—	7.41E-19	3.11E-24
Totals =	3.50E+01	9.77E+01	4.31E+00	4.31E+00	4.31E+00	—	—	3.25E+01	1.37E-04

File = "NEW ANL MOD_3R 1977-1994.xls"

Table B-16. Lower-bound inventory for waste stream ANL-MOD-3R (1977 through 1993).

BE Cs-137 Ci =	2.250	114.663	35.780	16.688	15.416	8.567	203.468	159.380	
Nuclide	Minimum Scaling Factor (Ci/Cs-137)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1984 (Ci)
H-3	9.84E-04	2.21E-03	1.13E-01	3.51E-02	1.64E-02	1.51E-02	8.41E-03	2.00E-01	1.56E-01
C-14	6.68E-07	1.50E-06	7.66E-05	2.39E-05	1.12E-05	1.03E-05	5.73E-06	1.36E-04	1.07E-04
Cl-36	4.12E-11	9.28E-11	4.73E-09	1.48E-09	6.88E-10	6.36E-10	3.53E-10	8.39E-09	6.57E-09
Co-60	1.91E-03	4.31E-03	2.20E-01	6.85E-02	3.20E-02	2.95E-02	1.64E-02	3.90E-01	3.05E-01
Ni-59	1.00E-06	2.25E-06	1.15E-04	3.58E-05	1.67E-05	1.54E-05	8.58E-06	2.04E-04	1.60E-04
Ni-63	1.93E-04	4.35E-04	2.22E-02	6.91E-03	3.22E-03	2.98E-03	1.66E-03	3.93E-02	3.08E-02
Sr-90	3.61E-01	8.13E-01	4.14E+01	1.29E+01	6.03E+00	5.57E+00	3.10E+00	7.35E+01	5.76E+01
N-b94	1.84E-07	4.14E-07	2.11E-05	6.58E-06	3.07E-06	2.83E-06	1.57E-06	3.74E-05	2.93E-05
Tc-99	6.11E-05	1.38E-04	7.01E-03	2.19E-03	1.02E-03	9.42E-04	5.24E-04	1.24E-02	9.74E-03
I-129	1.26E-07	2.84E-07	1.45E-05	4.51E-06	2.11E-06	1.95E-06	1.08E-06	2.57E-05	2.01E-05
Cs-137	5.00E-01	1.13E+00	5.73E+01	1.79E+01	8.34E+00	7.71E+00	4.28E+00	1.02E+02	7.97E+01
Eu-152	1.02E-05	2.29E-05	1.16E-03	3.64E-04	1.70E-04	1.57E-04	8.70E-05	2.07E-03	1.62E-03
Eu-154	1.06E-03	2.38E-03	1.22E-01	3.79E-02	1.77E-02	1.63E-02	9.08E-03	2.16E-01	1.69E-01
Pb-210	1.15E-13	2.59E-13	1.32E-11	4.12E-12	1.92E-12	1.78E-12	9.87E-13	2.34E-11	1.84E-11
Ra-226	5.37E-13	1.21E-12	6.16E-11	1.92E-11	8.96E-12	8.28E-12	4.60E-12	1.09E-10	8.56E-11
Ra-228	1.21E-17	2.72E-17	1.39E-15	4.33E-16	2.02E-16	1.87E-16	1.04E-16	2.46E-15	1.93E-15
Ac-227	1.77E-11	3.99E-11	2.03E-09	6.35E-10	2.96E-10	2.74E-10	1.52E-10	3.61E-09	2.83E-09
Th-228	2.09E-09	4.70E-09	2.39E-07	7.47E-08	3.48E-08	3.22E-08	1.79E-08	4.25E-07	3.33E-07
Th-229	4.17E-12	9.39E-12	4.78E-10	1.49E-10	6.96E-11	6.43E-11	3.57E-11	8.49E-10	6.65E-10
Th-230	2.47E-09	5.55E-09	2.83E-07	8.83E-08	4.12E-08	3.80E-08	2.11E-08	5.02E-07	3.93E-07
Th-232	5.19E-09	1.17E-08	5.95E-07	1.86E-07	8.66E-08	8.00E-08	4.45E-08	1.06E-06	8.27E-07
Pa-231	3.33E-10	7.50E-10	3.82E-08	1.19E-08	5.56E-09	5.14E-09	2.85E-09	6.78E-08	5.31E-08
U-232	5.71E-08	1.28E-07	6.54E-06	2.04E-06	9.52E-07	8.80E-07	4.89E-07	1.16E-05	9.09E-06
U-233	4.63E-09	1.04E-08	5.30E-07	1.66E-07	7.72E-08	7.13E-08	3.96E-08	9.41E-07	7.37E-07
U-234	3.02E-05	6.79E-05	3.46E-03	1.08E-03	5.04E-04	4.65E-04	2.59E-04	6.14E-03	4.81E-03
U-235	2.24E-06	5.04E-06	2.57E-04	8.01E-05	3.74E-05	3.45E-05	1.92E-05	4.55E-04	3.57E-04
U-236	1.94E-06	4.37E-06	2.23E-04	6.95E-05	3.24E-05	3.00E-05	1.67E-05	3.95E-04	3.10E-04
U-238	2.36E-07	5.32E-07	2.71E-05	8.46E-06	3.94E-06	3.64E-06	2.03E-06	4.81E-05	3.77E-05
Np-237	4.02E-07	9.05E-07	4.61E-05	1.44E-05	6.71E-06	6.20E-06	3.45E-06	8.18E-05	6.41E-05
Pu-238	1.38E-04	3.11E-04	1.59E-02	4.95E-03	2.31E-03	2.13E-03	1.19E-03	2.82E-02	2.21E-02
Pu-239	8.28E-03	1.86E-02	9.50E-01	2.96E-01	1.38E-01	1.28E-01	7.10E-02	1.69E+00	1.32E+00
Pu-240	2.54E-05	5.71E-05	2.91E-03	9.07E-04	4.23E-04	3.91E-04	2.17E-04	5.16E-03	4.04E-03
Pu-241	8.72E-05	1.96E-04	1.00E-02	3.12E-03	1.46E-03	1.34E-03	7.47E-04	1.78E-02	1.39E-02
Pu-242	6.97E-09	1.57E-08	8.00E-07	2.50E-07	1.16E-07	1.08E-07	5.98E-08	1.42E-06	1.11E-06
Pu-244	4.61E-18	1.04E-17	5.29E-16	1.65E-16	7.70E-17	7.11E-17	3.95E-17	9.38E-16	7.35E-16
Am-241	1.09E-05	2.46E-05	1.25E-03	3.91E-04	1.82E-04	1.68E-04	9.36E-05	2.22E-03	1.74E-03
Am-243	1.18E-09	2.66E-09	1.35E-07	4.23E-08	1.97E-08	1.82E-08	1.01E-08	2.40E-07	1.88E-07
Cm-243	3.36E-10	7.57E-10	3.86E-08	1.20E-08	5.61E-09	5.19E-09	2.88E-09	6.85E-08	5.36E-08
Cm-244	5.34E-09	1.20E-08	6.12E-07	1.91E-07	8.91E-08	8.23E-08	4.57E-08	1.09E-06	8.51E-07
Cm-245	5.24E-13	1.18E-12	6.01E-11	1.87E-11	8.74E-12	8.08E-12	4.49E-12	1.07E-10	8.35E-11
Cm-246	4.90E-15	1.10E-14	5.62E-13	1.75E-13	8.17E-14	7.55E-14	4.20E-14	9.97E-13	7.81E-13
Cm-247	1.10E-20	2.48E-20	1.26E-18	3.94E-19	1.84E-19	1.70E-19	9.45E-20	2.24E-18	1.76E-18
Cm-248	4.10E-21	9.22E-21	4.70E-19	1.47E-19	6.84E-20	6.32E-20	3.51E-20	8.34E-19	6.53E-19
Totals =		1.98E+00	1.01E+02	3.15E+01	1.47E+01	1.36E+01	7.54E+00	1.79E+02	1.40E+02

Table B-16 (Part 2). Lower-bound inventory for waste stream ANL-MOD-3R (1977 through 1993).

Cs-137 Ci =	19.472	54.400	2.400	2.400	2.400	0.000	0.000	18.098	0.00076
Nuclide	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)
H-3	1.91E-02	5.34E-02	2.35E-03	2.35E-03	2.35E-03	—	—	1.78E-02	7.46E-08
C-14	1.30E-05	3.64E-05	1.60E-06	1.60E-06	1.60E-06	—	—	1.21E-05	5.08E-11
Cl-36	8.03E-10	2.24E-09	9.90E-11	9.90E-11	9.90E-11	—	—	7.46E-10	3.13E-15
Co-60	3.73E-02	1.04E-01	4.60E-03	4.60E-03	4.60E-03	—	—	3.47E-02	1.46E-07
Ni-59	1.95E-05	5.45E-05	2.40E-06	2.40E-06	2.40E-06	—	—	1.81E-05	7.61E-11
Ni-63	3.76E-03	1.05E-02	4.64E-04	4.64E-04	4.64E-04	—	—	3.50E-03	1.47E-08
Sr-90	7.04E+00	1.97E+01	8.68E-01	8.68E-01	8.68E-01	—	—	6.54E+00	2.75E-05
Nb-94	3.58E-06	1.00E-05	4.41E-07	4.41E-07	4.41E-07	—	—	3.33E-06	1.40E-11
Tc-99	1.19E-03	3.33E-03	1.47E-04	1.47E-04	1.47E-04	—	—	1.11E-03	4.65E-09
I-129	2.46E-06	6.86E-06	3.03E-07	3.03E-07	3.03E-07	—	—	2.28E-06	9.59E-12
Cs-137	9.74E+00	2.72E+01	1.20E+00	1.20E+00	1.20E+00	—	—	9.05E+00	3.80E-05
Eu-152	1.98E-04	5.53E-04	2.44E-05	2.44E-05	2.44E-05	—	—	1.84E-04	7.72E-10
Eu-154	2.06E-02	5.77E-02	2.54E-03	2.54E-03	2.54E-03	—	—	1.92E-02	8.06E-08
Pb-210	2.24E-12	6.26E-12	2.76E-13	2.76E-13	2.76E-13	—	—	2.08E-12	8.75E-18
Ra-226	1.05E-11	2.92E-11	1.29E-12	1.29E-12	1.29E-12	—	—	9.72E-12	4.08E-17
Ra-228	2.36E-16	6.58E-16	2.90E-17	2.90E-17	2.90E-17	—	—	2.19E-16	9.20E-22
Ac-227	3.45E-10	9.65E-10	4.26E-11	4.26E-11	4.26E-11	—	—	3.21E-10	1.35E-15
Th-228	4.06E-08	1.14E-07	5.01E-09	5.01E-09	5.01E-09	—	—	3.78E-08	1.59E-13
Th-229	8.12E-11	2.27E-10	1.00E-11	1.00E-11	1.00E-11	—	—	7.55E-11	3.17E-16
Th-230	4.80E-08	1.34E-07	5.92E-09	5.92E-09	5.92E-09	—	—	4.46E-08	1.87E-13
Th-232	1.01E-07	2.82E-07	1.25E-08	1.25E-08	1.25E-08	—	—	9.39E-08	3.94E-13
Pa-231	6.49E-09	1.81E-08	8.00E-10	8.00E-10	8.00E-10	—	—	6.03E-09	2.53E-14
U-232	1.11E-06	3.10E-06	1.37E-07	1.37E-07	1.37E-07	—	—	1.03E-06	4.34E-12
U-233	9.01E-08	2.52E-07	1.11E-08	1.11E-08	1.11E-08	—	—	8.37E-08	3.52E-13
U-234	5.88E-04	1.64E-03	7.24E-05	7.24E-05	7.24E-05	—	—	5.46E-04	2.29E-09
U-235	4.36E-05	1.22E-04	5.37E-06	5.37E-06	5.37E-06	—	—	4.05E-05	1.70E-10
U-236	3.78E-05	1.06E-04	4.66E-06	4.66E-06	4.66E-06	—	—	3.52E-05	1.48E-10
U-238	4.60E-06	1.29E-05	5.67E-07	5.67E-07	5.67E-07	—	—	4.28E-06	1.80E-11
Np-237	7.83E-06	2.19E-05	9.65E-07	9.65E-07	9.65E-07	—	—	7.28E-06	3.06E-11
Pu-238	2.69E-03	7.53E-03	3.32E-04	3.32E-04	3.32E-04	—	—	2.50E-03	1.05E-08
Pu-239	1.61E-01	4.51E-01	1.99E-02	1.99E-02	1.99E-02	—	—	1.50E-01	6.29E-07
Pu-240	4.94E-04	1.38E-03	6.09E-05	6.09E-05	6.09E-05	—	—	4.59E-04	1.93E-09
Pu-241	1.70E-03	4.75E-03	2.09E-04	2.09E-04	2.09E-04	—	—	1.58E-03	6.63E-09
Pu-242	1.36E-07	3.79E-07	1.67E-08	1.67E-08	1.67E-08	—	—	1.26E-07	5.30E-13
Pu-244	8.98E-17	2.51E-16	1.11E-17	1.11E-17	1.11E-17	—	—	8.35E-17	3.50E-22
Am-241	2.13E-04	5.94E-04	2.62E-05	2.62E-05	2.62E-05	—	—	1.98E-04	8.30E-10
Am-243	2.30E-08	6.43E-08	2.84E-09	2.84E-09	2.84E-09	—	—	2.14E-08	8.98E-14
Cm-243	6.55E-09	1.83E-08	8.07E-10	8.07E-10	8.07E-10	—	—	6.09E-09	2.56E-14
Cm-244	1.04E-07	2.90E-07	1.28E-08	1.28E-08	1.28E-08	—	—	9.66E-08	4.06E-13
Cm-245	1.02E-11	2.85E-11	1.26E-12	1.26E-12	1.26E-12	—	—	9.48E-12	3.98E-17
Cm-246	9.54E-14	2.66E-13	1.18E-14	1.18E-14	1.18E-14	—	—	8.86E-14	3.72E-19
Cm-247	2.15E-19	6.00E-19	2.65E-20	2.65E-20	2.65E-20	—	—	2.00E-19	8.38E-25
Cm-248	7.98E-20	2.23E-19	9.83E-21	9.83E-21	9.83E-21	—	—	7.41E-20	3.11E-25
Totals =	1.71E+01	4.79E+01	2.11E+00	2.11E+00	2.11E+00	—	—	1.59E+01	6.69E-05

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Table B-17. Upper-bound inventory for waste stream ANL-MOD-3R (1977 through 1993).

BE Cs-137 Ci =	2.250	114.663	35.780	16.688	15.416	8.567	203.468	159.380
Maximum Scaling Factor	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1984 (Ci)
Nuclide (Ci/Cs-137)								
H-3	2.46E-02	5.52E-02	2.81E+00	8.78E-01	4.09E-01	3.78E-01	2.10E-01	4.99E+00
C-14	1.67E-05	3.76E-05	1.92E-03	5.98E-04	2.79E-04	2.58E-04	1.43E-04	3.40E-03
Cl-36	4.12E-07	9.28E-07	4.73E-05	1.48E-05	6.88E-06	6.36E-06	3.53E-06	8.39E-05
Co-60	1.91E-01	4.31E-01	2.20E+01	6.85E+00	3.20E+00	2.95E+00	1.64E+00	3.90E+01
Ni-59	1.00E-04	2.25E-04	1.15E-02	3.58E-03	1.67E-03	1.54E-03	8.58E-04	2.04E-02
Ni-63	7.73E-04	1.74E-03	8.86E-02	2.77E-02	1.29E-02	1.19E-02	6.62E-03	1.57E-01
Sr-90	1.45E+00	3.25E+00	1.66E+02	5.17E+01	2.41E+01	2.23E+01	1.24E+01	2.94E+02
Nb-94	1.65E-06	3.72E-06	1.90E-04	5.92E-05	2.76E-05	2.55E-05	1.42E-05	3.37E-04
Tc-99	2.45E-04	5.50E-04	2.80E-02	8.75E-03	4.08E-03	3.77E-03	2.09E-03	4.97E-02
I-129	5.05E-07	1.14E-06	5.79E-05	1.81E-05	8.42E-06	7.78E-06	4.32E-06	1.03E-04
Cs-137	2.00E+00	4.50E+00	2.29E+02	7.16E+01	3.34E+01	3.08E+01	1.71E+01	4.07E+02
Eu-152	2.54E-04	5.71E-04	2.91E-02	9.09E-03	4.24E-03	3.92E-03	2.18E-03	5.17E-02
Eu-154	2.65E-02	5.96E-02	3.04E+00	9.48E-01	4.42E-01	4.09E-01	2.27E-01	5.39E+00
Pb-210	1.15E-11	2.59E-11	1.32E-09	4.12E-10	1.92E-10	1.78E-10	9.87E-11	2.34E-09
Ra-226	2.15E-10	4.83E-10	2.46E-08	7.69E-09	3.59E-09	3.31E-09	1.84E-09	4.37E-08
Ra-228	1.21E-13	2.72E-13	1.39E-11	4.33E-12	2.02E-12	1.87E-12	1.04E-12	2.46E-11
Ac-227	7.10E-09	1.60E-08	8.14E-07	2.54E-07	1.18E-07	1.09E-07	6.08E-08	1.44E-06
Th-228	5.22E-06	1.17E-05	5.98E-04	1.87E-04	8.71E-05	8.04E-05	4.47E-05	1.06E-03
Th-229	3.76E-11	8.45E-11	4.31E-09	1.34E-09	6.27E-10	5.79E-10	3.22E-10	7.64E-09
Th-230	9.87E-09	2.22E-08	1.13E-06	3.53E-07	1.65E-07	1.52E-07	8.45E-08	2.01E-06
Th-232	1.30E-07	2.92E-07	1.49E-05	4.64E-06	2.16E-06	2.00E-06	1.11E-06	2.64E-05
Pa-231	8.33E-09	1.87E-08	9.55E-07	2.98E-07	1.39E-07	1.28E-07	7.14E-08	1.70E-06
U-232	2.28E-07	5.14E-07	2.62E-05	8.17E-06	3.81E-06	3.52E-06	1.96E-06	4.64E-05
U-233	1.85E-08	4.16E-08	2.12E-06	6.62E-07	3.09E-07	2.85E-07	1.59E-07	3.76E-06
U-234	1.21E-04	2.72E-04	1.38E-02	4.32E-03	2.01E-03	1.86E-03	1.03E-03	2.46E-02
U-235	2.71E-06	6.09E-06	3.11E-04	9.69E-05	4.52E-05	4.18E-05	2.32E-05	5.51E-04
U-236	7.77E-06	1.75E-05	8.91E-04	2.78E-04	1.30E-04	1.20E-04	6.66E-05	1.58E-03
U-238	9.46E-07	2.13E-06	1.08E-04	3.38E-05	1.58E-05	1.46E-05	8.10E-06	1.92E-04
Np-237	1.61E-06	3.62E-06	1.84E-04	5.76E-05	2.68E-05	2.48E-05	1.38E-05	3.27E-04
Pu-238	1.25E-03	2.80E-03	1.43E-01	4.46E-02	2.08E-02	1.92E-02	1.07E-02	2.53E-01
Pu-239	3.31E-02	7.45E-02	3.80E+00	1.19E+00	5.53E-01	5.11E-01	2.84E-01	6.74E+00
Pu-240	2.54E-03	5.71E-03	2.91E-01	9.07E-02	4.23E-02	3.91E-02	2.17E-02	5.16E-01
Pu-241	2.18E-01	4.91E-01	2.50E+01	7.80E+00	3.64E+00	3.36E+00	1.87E+00	4.44E+01
Pu-242	6.97E-07	1.57E-06	8.00E-05	2.50E-05	1.16E-05	1.08E-05	5.98E-06	1.42E-04
Pu-244	4.61E-16	1.04E-15	5.29E-14	1.65E-14	7.70E-15	7.11E-15	3.95E-15	9.38E-14
Am-241	1.09E-03	2.46E-03	1.25E-01	3.91E-02	1.82E-02	1.68E-02	9.36E-03	2.22E-01
Am-243	2.95E-06	6.65E-06	3.39E-04	1.06E-04	4.93E-05	4.55E-05	2.53E-05	6.01E-04
Cm-243	8.41E-07	1.89E-06	9.64E-05	3.01E-05	1.40E-05	1.30E-05	7.21E-06	1.71E-04
Cm-244	5.34E-05	1.20E-04	6.12E-03	1.91E-03	8.91E-04	8.23E-04	4.57E-04	1.09E-02
Cm-245	1.31E-09	2.95E-09	1.50E-07	4.69E-08	2.19E-08	2.02E-08	1.12E-08	2.67E-07
Cm-246	1.22E-11	2.76E-11	1.40E-09	4.38E-10	2.04E-10	1.89E-10	1.05E-10	2.49E-09
Cm-247	4.41E-18	9.92E-18	5.06E-16	1.58E-16	7.36E-17	6.80E-17	3.78E-17	8.97E-16
Cm-248	4.10E-19	9.22E-19	4.70E-17	1.47E-17	6.84E-18	6.32E-18	3.51E-18	8.34E-17
Totals =		8.91E+00	4.54E+02	1.42E+02	6.61E+01	6.10E+01	3.39E+01	8.06E+02
								6.31E+02

Table B-17 (Part 2). Upper-bound inventory for waste stream ANL-MOD-3R (1977 through 1993).

Cs-137 Ci =	19.472	54.400	2.400	2.400	2.400	0.000	0.000	18.098	0.00076
Nuclide	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)	1992 (Ci)	1993 (Ci)
H-3	4.78E-01	1.33E+00	5.89E-02	5.89E-02	5.89E-02	—	—	4.44E-01	1.86E-06
C-14	3.25E-04	9.09E-04	4.01E-05	4.01E-05	4.01E-05	—	—	3.02E-04	1.27E-09
Cl-36	8.03E-06	2.24E-05	9.90E-07	9.90E-07	9.90E-07	—	—	7.46E-06	3.13E-11
Co-60	3.73E+00	1.04E+01	4.60E-01	4.60E-01	4.60E-01	—	—	3.47E+00	1.46E-05
Ni-59	1.95E-03	5.45E-03	2.40E-04	2.40E-04	2.40E-04	—	—	1.81E-03	7.61E-09
Ni-63	1.50E-02	4.20E-02	1.85E-03	1.85E-03	1.85E-03	—	—	1.40E-02	5.87E-08
Sr-90	2.82E+01	7.87E+01	3.47E+00	3.47E+00	3.47E+00	—	—	2.62E+01	1.10E-04
Nb-94	3.22E-05	9.00E-05	3.97E-06	3.97E-06	3.97E-06	—	—	2.99E-05	1.26E-10
Tc-99	4.76E-03	1.33E-02	5.87E-04	5.87E-04	5.87E-04	—	—	4.42E-03	1.86E-08
I-129	9.83E-06	2.75E-05	1.21E-06	1.21E-06	1.21E-06	—	—	9.13E-06	3.84E-11
Cs-137	3.89E+01	1.09E+02	4.80E+00	4.80E+00	4.80E+00	—	—	3.62E+01	1.52E-04
Eu-152	4.95E-03	1.38E-02	6.10E-04	6.10E-04	6.10E-04	—	—	4.60E-03	1.93E-08
Eu-154	5.16E-01	1.44E+00	6.36E-02	6.36E-02	6.36E-02	—	—	4.80E-01	2.01E-06
Pb-210	2.24E-10	6.26E-10	2.76E-11	2.76E-11	2.76E-11	—	—	2.08E-10	8.75E-16
Ra-226	4.18E-09	1.17E-08	5.16E-10	5.16E-10	5.16E-10	—	—	3.89E-09	1.63E-14
Ra-228	2.36E-12	6.58E-12	2.90E-13	2.90E-13	2.90E-13	—	—	2.19E-12	9.20E-18
Ac-227	1.38E-07	3.86E-07	1.70E-08	1.70E-08	1.70E-08	—	—	1.28E-07	5.39E-13
Th-228	1.02E-04	2.84E-04	1.25E-05	1.25E-05	1.25E-05	—	—	9.44E-05	3.97E-10
Th-229	7.31E-10	2.04E-09	9.01E-11	9.01E-11	9.01E-11	—	—	6.80E-10	2.85E-15
Th-230	1.92E-07	5.37E-07	2.37E-08	2.37E-08	2.37E-08	—	—	1.79E-07	7.50E-13
Th-232	2.53E-06	7.06E-06	3.11E-07	3.11E-07	3.11E-07	—	—	2.35E-06	9.86E-12
Pa-231	1.62E-07	4.53E-07	2.00E-08	2.00E-08	2.00E-08	—	—	1.51E-07	6.33E-13
U-232	4.44E-06	1.24E-05	5.48E-07	5.48E-07	5.48E-07	—	—	4.13E-06	1.73E-11
U-233	3.60E-07	1.01E-06	4.44E-08	4.44E-08	4.44E-08	—	—	3.35E-07	1.41E-12
U-234	2.35E-03	6.57E-03	2.90E-04	2.90E-04	2.90E-04	—	—	2.18E-03	9.17E-09
U-235	5.27E-05	1.47E-04	6.50E-06	6.50E-06	6.50E-06	—	—	4.90E-05	2.06E-10
U-236	1.51E-04	4.23E-04	1.87E-05	1.87E-05	1.87E-05	—	—	1.41E-04	5.91E-10
U-238	1.84E-05	5.14E-05	2.27E-06	2.27E-06	2.27E-06	—	—	1.71E-05	7.19E-11
Np-237	3.13E-05	8.75E-05	3.86E-06	3.86E-06	3.86E-06	—	—	2.91E-05	1.22E-10
Pu-238	2.43E-02	6.78E-02	2.99E-03	2.99E-03	2.99E-03	—	—	2.25E-02	9.47E-08
Pu-239	6.45E-01	1.80E+00	7.95E-02	7.95E-02	7.95E-02	—	—	6.00E-01	2.52E-06
Pu-240	4.94E-02	1.38E-01	6.09E-03	6.09E-03	6.09E-03	—	—	4.59E-02	1.93E-07
Pu-241	4.25E+00	1.19E+01	5.23E-01	5.23E-01	5.23E-01	—	—	3.95E+00	1.66E-05
Pu-242	1.36E-05	3.79E-05	1.67E-06	1.67E-06	1.67E-06	—	—	1.26E-05	5.30E-11
Pu-244	8.98E-15	2.51E-14	1.11E-15	1.11E-15	1.11E-15	—	—	8.35E-15	3.50E-20
Am-241	2.13E-02	5.94E-02	2.62E-03	2.62E-03	2.62E-03	—	—	1.98E-02	8.30E-08
Am-243	5.75E-05	1.61E-04	7.09E-06	7.09E-06	7.09E-06	—	—	5.35E-05	2.24E-10
Cm-243	1.64E-05	4.58E-05	2.02E-06	2.02E-06	2.02E-06	—	—	1.52E-05	6.39E-11
Cm-244	1.04E-03	2.90E-03	1.28E-04	1.28E-04	1.28E-04	—	—	9.66E-04	4.06E-09
Cm-245	2.55E-08	7.13E-08	3.14E-09	3.14E-09	3.14E-09	—	—	2.37E-08	9.95E-14
Cm-246	2.38E-10	6.66E-10	2.94E-11	2.94E-11	2.94E-11	—	—	2.22E-10	9.31E-16
Cm-247	8.59E-17	2.40E-16	1.06E-17	1.06E-17	1.06E-17	—	—	7.98E-17	3.35E-22
Cm-248	7.98E-18	2.23E-17	9.83E-19	9.83E-19	9.83E-19	—	—	7.41E-18	3.11E-23
Totals =	7.71E+01	2.15E+02	9.50E+00	9.50E+00	9.50E+00	—	—	7.17E+01	3.01E-04

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B-5. IRRADIATED SUBASSEMBLY HARDWARE SENT FROM ANL-W TO THE RWMC FROM 1977 THROUGH 1993

Nearly all of ANL-W neutron-activated waste consisted of stainless steel (SS) components from EBR-II subassemblies (e.g., alloys 304 and 316). The two primary waste streams are ANL-MOD-1H (1977 through 1983) and ANL-MOD-1R (1984 through 1993). Using detailed information concerning the specific EBR-II subassemblies sent to the RWMC for disposal (data contained in Appendix C), a detailed inventory of radionuclides was calculated for each of the approximately 1,800 subassemblies irradiated in the EBR-II and then disposed of at the RWMC. These calculations were originally performed for C-14, Co-60, Ni-59, Ni-63, Nb-94, and Tc-99. Cl-36 was not included in the original set of radionuclides. However, it was not difficult to modify the original analysis and incorporate a 70-ppm chlorine (Cl-35) impurity in the EBR-II steel and then calculate a Cl-36 activity. Also, the first set of calculations assumed that all of the EBR-II stainless steel was alloy 304. This assumption was essentially correct early into the operation of the EBR-II; however, the design of EBR-II subassemblies evolved from a nearly all SS304 design to a configuration consisting of large portions of SS316. Since SS316 contains a slightly different alloy composition than SS304 (e.g., SS316 contains more Ni and more Mo than SS304, but less Cr), it was necessary to modify the original analysis to incorporate a change in alloy composition. This is explained in further detail in Appendix C.

The final results for waste streams ANL-MOD-1H and ANL-MOD-1R are shown in Tables B-18 through B-23. As explained in Appendix C, there is a factor 2 uncertainty in the best-estimate results (shown in Tables B-18 and B-19). Therefore, the lower-bound results = best-estimate results \div 2.0; and the upper-bound results = best-estimate results \bullet 2.0.

Table B-18. Best-estimate inventory for waste stream ANL-MOD-1H (1977 through 1983).

Nuclide	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1977–1983 (Ci)
C-14	3.23E+00	2.38E+00	3.92E+00	2.49E+00	1.24E+00	1.64E+00	1.14E+00	1.60E+01
Cl-36	7.86E-04	6.05E-04	7.11E-04	5.36E-04	5.06E-04	4.63E-04	4.49E-04	4.05E-03
Co-60	1.66E+05	1.22E+05	1.96E+05	1.17E+05	6.14E+04	8.47E+04	6.14E+04	8.09E+05
Ni-59	1.68E+01	1.25E+01	2.22E+01	1.49E+01	5.55E+00	8.23E+00	5.59E+00	8.57E+01
Ni-63	1.23E+03	9.25E+02	1.63E+03	1.07E+03	4.02E+02	6.04E+02	4.08E+02	6.27E+03
Nb-94	5.51E-01	4.14E-01	7.39E-01	4.89E-01	1.72E-01	2.69E-01	1.79E-01	2.81E+00
Tc-99	1.35E+00	1.02E+00	1.79E+00	1.17E+00	4.35E-01	6.64E-01	4.49E-01	6.88E+00
Totals =	1.67E+05	1.23E+05	1.98E+05	1.18E+05	6.18E+04	8.53E+04	6.18E+04	8.15E+05

Table B-19. Best-estimate inventory for waste stream ANL-MOD-1R (1984 through 1993).

Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)
C-14	1.55E+00	1.83E+00	1.67E+00	2.57E+00	1.23E+00	2.10E+00	1.63E+00
Cl-36	4.62E-04	4.00E-04	4.37E-04	5.96E-04	3.95E-04	3.17E-04	5.02E-04
Co-60	6.96E+04	9.10E+04	8.01E+04	1.28E+05	6.31E+04	1.00E+05	7.72E+04
Ni-59	6.97E+00	9.93E+00	8.27E+00	1.31E+01	6.48E+00	1.21E+01	8.16E+00
Ni-63	5.00E+02	7.26E+02	6.02E+02	9.59E+02	4.72E+02	8.76E+02	5.91E+02
Nb-94	2.18E-01	3.26E-01	2.67E-01	4.28E-01	2.10E-01	3.99E-01	2.61E-01
Tc-99	5.37E-01	7.95E-01	6.56E-01	1.05E+00	5.17E-01	9.58E-01	6.40E-01
Totals =	7.01E+04	9.17E+04	8.07E+04	1.29E+05	6.36E+04	1.01E+05	7.78E+04
Nuclide	1991 (Ci)	1992 (Ci)	1993 (Ci)	1984–1993 (Ci)			1977–1993 ^a (Ci)
C-14	1.01E+00	9.11E-01	8.47E-01	1.54E+01			3.14E+01
Cl-36	2.37E-04	2.36E-04	2.32E-04	3.82E-03			7.87E-03
Co-60	4.87E+04	3.93E+04	3.78E+04	7.35E+05			1.54E+06
Ni-59	5.80E+00	4.20E+00	3.92E+00	7.89E+01			1.65E+02
Ni-63	4.21E+02	3.00E+02	2.82E+02	5.73E+03			1.20E+04
Nb-94	1.90E-01	1.32E-01	1.23E-01	2.55E+00			5.37E+00
Tc-99	4.59E-01	3.21E-01	3.03E-01	6.24E+00			1.31E+01
Totals =	4.91E+04	3.96E+04	3.81E+04	7.41E+05			1.56E+06

a. This column includes both waste streams (ANL-MOD-1H and ANL-MOD-1R).

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Table B-20. Lower-bound inventory for waste stream ANL-MOD-1H (1977 through 1983).

Nuclide	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1977–1983 (Ci)
C-14	1.62E+00	1.19E+00	1.96E+00	1.25E+00	6.18E-01	8.21E-01	5.69E-01	8.02E+00
Cl-36	3.93E-04	3.02E-04	3.56E-04	2.68E-04	2.53E-04	2.31E-04	2.25E-04	2.03E-03
Co-60	8.29E+04	6.09E+04	9.82E+04	5.84E+04	3.07E+04	4.24E+04	3.07E+04	4.04E+05
Ni-59	8.38E+00	6.26E+00	1.11E+01	7.46E+00	2.78E+00	4.11E+00	2.79E+00	4.29E+01
Ni-63	6.15E+02	4.62E+02	8.15E+02	5.36E+02	2.01E+02	3.02E+02	2.04E+02	3.14E+03
Nb-94	2.76E-01	2.07E-01	3.70E-01	2.44E-01	8.62E-02	1.34E-01	8.94E-02	1.41E+00
Tc-99	6.77E-01	5.09E-01	8.97E-01	5.84E-01	2.17E-01	3.32E-01	2.24E-01	3.44E+00
Totals =	8.35E+04	6.14E+04	9.91E+04	5.90E+04	3.09E+04	4.27E+04	3.09E+04	4.07E+05

Table B-21. Lower-bound inventory for waste stream ANL-MOD-1R (1984 through 1993).

Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)
C-14	7.73E-01	9.17E-01	8.34E-01	1.29E+00	6.14E-01	1.05E+00	8.17E-01
Cl-36	2.31E-04	2.00E-04	2.19E-04	2.98E-04	1.98E-04	1.59E-04	2.51E-04
Co-60	3.48E+04	4.55E+04	4.00E+04	6.39E+04	3.15E+04	5.01E+04	3.86E+04
Ni-59	3.49E+00	4.97E+00	4.13E+00	6.55E+00	3.24E+00	6.03E+00	4.08E+00
Ni-63	2.50E+02	3.63E+02	3.01E+02	4.80E+02	2.36E+02	4.38E+02	2.95E+02
Nb-94	1.09E-01	1.63E-01	1.34E-01	2.14E-01	1.05E-01	2.00E-01	1.31E-01
Tc-99	2.68E-01	3.97E-01	3.28E-01	5.25E-01	2.58E-01	4.79E-01	3.20E-01
Totals =	3.51E+04	4.59E+04	4.03E+04	6.44E+04	3.18E+04	5.06E+04	3.89E+04
Nuclide	1991 (Ci)	1992 (Ci)	1993 (Ci)	1984–1993 (Ci)			1977–1993 ^a (Ci)
C-14	5.07E-01	4.56E-01	4.23E-01	7.68E+00			1.57E+01
C-136	1.18E-04	1.18E-04	1.16E-04	1.91E-03			3.93E-03
Co-60	2.43E+04	1.96E+04	1.89E+04	3.67E+05			7.72E+05
Ni-59	2.90E+00	2.10E+00	1.96E+00	3.94E+01			8.23E+01
Ni-63	2.11E+02	1.50E+02	1.41E+02	2.86E+03			6.00E+03
Nb-94	9.51E-02	6.58E-02	6.16E-02	1.28E+00			2.68E+00
Tc-99	2.30E-01	1.61E-01	1.51E-01	3.12E+00			6.56E+00
Totals =	2.46E+04	1.98E+04	1.91E+04	3.70E+05			7.78E+05

a. This column includes both waste streams (ANL-MOD-1H and ANL-MOD-1R).

File = "NEW activationproducts.xls"

Table B-22. Upper-bound inventory for waste stream ANL-MOD-1H (1977 through 1983).

Nuclide	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1977–1983 (Ci)
C-14	6.46E+00	4.77E+00	7.84E+00	4.98E+00	2.47E+00	3.28E+00	2.27E+00	3.21E+01
Cl-36	1.57E-03	1.21E-03	1.42E-03	1.07E-03	1.01E-03	9.25E-04	8.99E-04	8.11E-03
Co-60	3.31E+05	2.44E+05	3.93E+05	2.34E+05	1.23E+05	1.69E+05	1.23E+05	1.62E+06
Ni-59	3.35E+01	2.50E+01	4.43E+01	2.98E+01	1.11E+01	1.65E+01	1.12E+01	1.71E+02
Ni-63	2.46E+03	1.85E+03	3.26E+03	2.14E+03	8.03E+02	1.21E+03	8.17E+02	1.25E+04
Nb-94	1.10E+00	8.28E-01	1.48E+00	9.78E-01	3.45E-01	5.37E-01	3.58E-01	5.63E+00
Tc-99	2.71E+00	2.03E+00	3.59E+00	2.34E+00	8.69E-01	1.33E+00	8.98E-01	1.38E+01
Totals =	3.34E+05	2.46E+05	3.96E+05	2.36E+05	1.24E+05	1.71E+05	1.24E+05	1.63E+06

Table B-23. Upper-bound inventory for waste stream ANL-MOD-1R (1984 through 1993).

Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)
C-14	3.09E+00	3.67E+00	3.34E+00	5.14E+00	2.45E+00	4.21E+00	3.27E+00
Cl-36	9.25E-04	7.99E-04	8.74E-04	1.19E-03	7.91E-04	6.35E-04	1.00E-03
Co-60	1.39E+05	1.82E+05	1.60E+05	2.56E+05	1.26E+05	2.00E+05	1.54E+05
Ni-59	1.39E+01	1.99E+01	1.65E+01	2.62E+01	1.30E+01	2.41E+01	1.63E+01
Ni-63	9.99E+02	1.45E+03	1.20E+03	1.92E+03	9.43E+02	1.75E+03	1.18E+03
Nb-94	4.36E-01	6.52E-01	5.34E-01	8.55E-01	4.20E-01	7.98E-01	5.23E-01
Tc-99	1.07E+00	1.59E+00	1.31E+00	2.10E+00	1.03E+00	1.92E+00	1.28E+00
Totals =	1.40E+05	1.83E+05	1.61E+05	2.58E+05	1.27E+05	2.02E+05	1.56E+05

Nuclide	1991 (Ci)	1992 (Ci)	1993 (Ci)	1984–1993 (Ci)	1977–1993 ^a (Ci)
C-14	2.03E+00	1.82E+00	1.69E+00	3.07E+01	6.28E+01
Cl-36	4.74E-04	4.72E-04	4.65E-04	7.63E-03	1.57E-02
Co-60	9.73E+04	7.85E+04	7.57E+04	1.47E+06	3.09E+06
Ni-59	1.16E+01	8.40E+00	7.85E+00	1.58E+02	3.29E+02
Ni-63	8.42E+02	6.01E+02	5.65E+02	1.15E+04	2.40E+04
Nb-94	3.81E-01	2.63E-01	2.46E-01	5.11E+00	1.07E+01
Tc-99	9.19E-01	6.42E-01	6.06E-01	1.25E+01	2.62E+01
Totals =	9.82E+04	7.91E+04	7.63E+04	1.48E+06	3.11E+06

a. This column includes both waste streams (ANL-MOD-1H and ANL-MOD-1R).

File = "NEW activationproducts.xls"

B-6. GENERAL PLANT WASTES SENT FROM ANL-W TO THE RWMC FROM 1960 THROUGH 1993

General plant wastes consisted of all radioactive wastes not included in previously defined waste streams. The two waste streams making up this category are ANL-MOD-5H (1960 through 1983) and ANL-MOD-4R (1984 through 1993). The detailed radionuclide inventory for these two waste streams was determined by multiplying the scaling factors shown in Table B-7 by the estimated Cs-137 activity for each year that these wastes were disposed. The Cs-137 activity was determined using two techniques. First, for the period spanning 1960 through 1970, the Cs-137 activity was estimated to be 25% of the total gross activity, as determined from the following three references: (1) RWMIS data, (2) Form 110-shipping records, and (3) the activity data reported in the WasteOScope database. For instance,

Cs-137 activity = $0.25 \bullet (\text{total gross activity for each year between 1960 and 1970})$; where the total gross activity is determined to be the average of the total activity data in the following three datasets:

Gross activity = Average(RWMIS data, Form 110-shipping record data, and data in WasteOScope database).

Second, from 1971–1993, the Cs-137 activity was determined using the following formula:

Cs-137 activity = (Reported Cs-137 activity in “general plant wastes” from RWMIS) +
 $0.25 \bullet (\text{MFPs} + \text{UNID:B+G})$.

In the above equation, MFPs = “mixed fission products” and UNID:B+G = “unidentified beta+gamma” activity. Note that the time-dependent Cs-137 inventory is complex because explicit Cs-137 data does not exist before 1971.

The estimated time-dependent Cs-137 activities associated with the general plant waste streams are shown in the first row of Tables B-24 through B-29.

The best-estimate activities contained in the general plant waste streams are shown in Tables B-24 (ANL-MOD-5H) and Table B-27 (ANL-MOD-4R). The lower-bound activities are shown in Tables B-25 (ANL-MOD-5H) and Table B-28 (ANL-MOD-4R). Finally, the upper-bound activities are shown in Table B-26 (ANL-MOD-5H) and Table B-29 (ANL-MOD-4R).

Table B-24. Best-estimate inventory for the general plant waste stream ANL-MOD-5H (1960 through 1983).

BE Cs-137 Ci =	0.38	17.50	68.13	0.75	86.88	96.63	1099.41	2752.14	
Best-estimate Scaling Factor		1960	1961	1962	1963	1964	1965	1966	1967
Nuclide	(Ci/Cs-137)	(Ci)							
H-3	4.92E-03	1.84E-03	8.59E-02	3.34E-01	3.68E-03	4.26E-01	4.74E-01	5.39E+00	1.35E+01
C-14	3.34E-06	1.25E-06	5.85E-05	2.28E-04	2.51E-06	2.90E-04	3.23E-04	3.67E-03	9.20E-03
Cl-36	4.12E-09	1.55E-09	7.22E-08	2.81E-07	3.09E-09	3.58E-07	3.99E-07	4.53E-06	1.14E-05
Co-60	1.91E-02	7.18E-03	3.35E-01	1.30E+00	1.44E-02	1.66E+00	1.85E+00	2.11E+01	5.27E+01
Ni-59	1.00E-05	3.76E-06	1.75E-04	6.82E-04	7.51E-06	8.70E-04	9.68E-04	1.10E-02	2.76E-02
Ni-63	3.86E-04	1.45E-04	6.76E-03	2.63E-02	2.90E-04	3.36E-02	3.73E-02	4.25E-01	1.06E+00
Sr-90	7.23E-01	2.71E-01	1.27E+01	4.93E+01	5.42E-01	6.28E+01	6.99E+01	7.95E+02	1.99E+03
Nb-94	5.51E-07	2.07E-07	9.65E-06	3.76E-05	4.14E-07	4.79E-05	5.33E-05	6.06E-04	1.52E-03
Tc-99	1.22E-04	4.58E-05	2.14E-03	8.33E-03	9.17E-05	1.06E-02	1.18E-02	1.34E-01	3.36E-01
I-129	2.52E-07	9.46E-08	4.42E-06	1.72E-05	1.89E-07	2.19E-05	2.44E-05	2.77E-04	6.94E-04
Cs-137	1.00E+00	3.75E-01	1.75E+01	6.81E+01	7.50E-01	8.69E+01	9.66E+01	1.10E+03	2.75E+03
Eu-152	5.08E-05	1.90E-05	8.89E-04	3.46E-03	3.81E-05	4.41E-03	4.91E-03	5.58E-02	1.40E-01
Eu-154	5.30E-03	1.99E-03	9.27E-02	3.61E-01	3.97E-03	4.60E-01	5.12E-01	5.83E+00	1.46E+01
Pb-210	1.15E-12	4.32E-13	2.02E-11	7.85E-11	8.64E-13	1.00E-10	1.11E-10	1.27E-09	3.17E-09
Ra-226	1.07E-11	4.03E-12	1.88E-10	7.32E-10	8.06E-12	9.33E-10	1.04E-09	1.18E-08	2.96E-08
Ra-228	1.21E-15	4.54E-16	2.12E-14	8.24E-14	9.08E-16	1.05E-13	1.17E-13	1.33E-12	3.33E-12
Ac-227	3.55E-10	1.33E-10	6.21E-09	2.42E-08	2.66E-10	3.08E-08	3.43E-08	3.90E-07	9.77E-07
Th-228	1.04E-07	3.91E-08	1.83E-06	7.11E-06	7.83E-08	9.07E-06	1.01E-05	1.15E-04	2.87E-04
Th-229	1.25E-11	4.69E-12	2.19E-10	8.53E-10	9.39E-12	1.09E-09	1.21E-09	1.38E-08	3.44E-08
Th-230	4.93E-09	1.85E-09	8.63E-08	3.36E-07	3.70E-09	4.29E-07	4.77E-07	5.42E-06	1.36E-05
Th-232	2.60E-08	9.73E-09	4.54E-07	1.77E-06	1.95E-08	2.25E-06	2.51E-06	2.85E-05	7.14E-05
Pa-231	1.67E-09	6.25E-10	2.92E-08	1.14E-07	1.25E-09	1.45E-07	1.61E-07	1.83E-06	4.59E-06
U-232	1.14E-07	4.28E-08	2.00E-06	7.77E-06	8.56E-08	9.91E-06	1.10E-05	1.25E-04	3.14E-04
U-233	9.25E-09	3.47E-09	1.62E-07	6.30E-07	6.94E-09	8.04E-07	8.94E-07	1.02E-05	2.55E-05
U-234	6.04E-05	2.26E-05	1.06E-03	4.11E-03	4.53E-05	5.24E-03	5.83E-03	6.64E-02	1.66E-01
U-235	2.46E-06	9.23E-07	4.31E-05	1.68E-04	1.85E-06	2.14E-04	2.38E-04	2.71E-03	6.78E-03
U-236	3.89E-06	1.46E-06	6.80E-05	2.65E-04	2.92E-06	3.38E-04	3.76E-04	4.27E-03	1.07E-02
U-238	4.73E-07	1.77E-07	8.27E-06	3.22E-05	3.55E-07	4.11E-05	4.57E-05	5.20E-04	1.30E-03
Np-237	8.04E-07	3.02E-07	1.41E-05	5.48E-05	6.03E-07	6.99E-05	7.77E-05	8.84E-04	2.21E-03
Pu-238	4.15E-04	1.56E-04	7.27E-03	2.83E-02	3.11E-04	3.61E-02	4.01E-02	4.56E-01	1.14E+00
Pu-239	1.66E-02	6.21E-03	2.90E-01	1.13E+00	1.24E-02	1.44E+00	1.60E+00	1.82E+01	4.56E+01
Pu-240	2.54E-04	9.51E-05	4.44E-03	1.73E-02	1.90E-04	2.20E-02	2.45E-02	2.79E-01	6.98E-01
Pu-241	4.36E-03	1.64E-03	7.63E-02	2.97E-01	3.27E-03	3.79E-01	4.21E-01	4.80E+00	1.20E+01
Pu-242	6.97E-08	2.62E-08	1.22E-06	4.75E-06	5.23E-08	6.06E-06	6.74E-06	7.67E-05	1.92E-04
Pu-244	4.61E-17	1.73E-17	8.07E-16	3.14E-15	3.46E-17	4.01E-15	4.46E-15	5.07E-14	1.27E-13
Am-241	1.09E-04	4.10E-05	1.91E-03	7.44E-03	8.19E-05	9.49E-03	1.06E-02	1.20E-01	3.01E-01
Am-243	5.91E-08	2.22E-08	1.03E-06	4.02E-06	4.43E-08	5.13E-06	5.71E-06	6.49E-05	1.63E-04
Cm-243	1.68E-08	6.31E-09	2.94E-07	1.15E-06	1.26E-08	1.46E-06	1.63E-06	1.85E-05	4.63E-05
Cm-244	5.34E-07	2.00E-07	9.34E-06	3.64E-05	4.00E-07	4.64E-05	5.16E-05	5.87E-04	1.47E-03
Cm-245	2.62E-11	9.82E-12	4.58E-10	1.78E-09	1.96E-11	2.28E-09	2.53E-09	2.88E-08	7.21E-08
Cm-246	2.45E-13	9.18E-14	4.29E-12	1.67E-11	1.84E-13	2.13E-11	2.37E-11	2.69E-10	6.74E-10
Cm-247	2.21E-19	8.27E-20	3.86E-18	1.50E-17	1.65E-19	1.92E-17	2.13E-17	2.42E-16	6.07E-16
Cm-248	4.10E-20	1.54E-20	7.17E-19	2.79E-18	3.07E-20	3.56E-18	3.96E-18	4.50E-17	1.13E-16
Totals =		6.74E-01	3.14E+01	1.22E+02	1.35E+00	1.56E+02	1.74E+02	1.98E+03	4.94E+03

Table B-24 (Part 2). Best-estimate inventory for waste stream ANL-MOD-5H (1960 through 1983).

Cs-137 Ci =	5132.18	1916.23	413.10	1235.27	10.95	669.27	124.81	42.97	124.68
Nuclide	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)
H-3	2.52E+01	9.40E+00	2.03E+00	6.06E+00	5.37E-02	3.28E+00	6.12E-01	2.11E-01	6.12E-01
C-14	1.71E-02	6.40E-03	1.38E-03	4.13E-03	3.66E-05	2.24E-03	4.17E-04	1.44E-04	4.17E-04
Cl-36	2.12E-05	7.90E-06	1.70E-06	5.10E-06	4.52E-08	2.76E-06	5.15E-07	1.77E-07	5.14E-07
Co-60	9.83E+01	3.67E+01	7.91E+00	2.37E+01	2.10E-01	1.28E+01	2.39E+00	8.23E-01	2.39E+00
Ni-59	5.14E-02	1.92E-02	4.14E-03	1.24E-02	1.10E-04	6.70E-03	1.25E-03	4.30E-04	1.25E-03
Ni-63	1.98E+00	7.40E-01	1.60E-01	4.77E-01	4.23E-03	2.59E-01	4.82E-02	1.66E-02	4.82E-02
Sr-90	3.71E+03	1.39E+03	2.99E+02	8.93E+02	7.91E+00	4.84E+02	9.02E+01	3.11E+01	9.01E+01
Nb-94	2.83E-03	1.06E-03	2.28E-04	6.81E-04	6.04E-06	3.69E-04	6.88E-05	2.37E-05	6.88E-05
Tc-99	6.27E-01	2.34E-01	5.05E-02	1.51E-01	1.34E-03	8.18E-02	1.53E-02	5.25E-03	1.52E-02
I-129	1.30E-03	4.84E-04	1.04E-04	3.12E-04	2.76E-06	1.69E-04	3.15E-05	1.08E-05	3.15E-05
Cs-137	5.13E+03	1.92E+03	4.13E+02	1.24E+03	1.09E+01	6.69E+02	1.25E+02	4.30E+01	1.25E+02
Eu-152	2.61E-01	9.73E-02	2.10E-02	6.27E-02	5.56E-04	3.40E-02	6.34E-03	2.18E-03	6.33E-03
Eu-154	2.72E+01	1.02E+01	2.19E+00	6.55E+00	5.80E-02	3.55E+00	6.61E-01	2.28E-01	6.61E-01
Pb-210	5.91E-09	2.21E-09	4.76E-10	1.42E-09	1.26E-11	7.71E-10	1.44E-10	4.95E-11	1.44E-10
Ra-226	5.51E-08	2.06E-08	4.44E-09	1.33E-08	1.18E-10	7.19E-09	1.34E-09	4.62E-10	1.34E-09
Ra-228	6.21E-12	2.32E-12	5.00E-13	1.49E-12	1.32E-14	8.10E-13	1.51E-13	5.20E-14	1.51E-13
Ac-227	1.82E-06	6.80E-07	1.47E-07	4.38E-07	3.89E-09	2.37E-07	4.43E-08	1.52E-08	4.42E-08
Th-228	5.36E-04	2.00E-04	4.31E-05	1.29E-04	1.14E-06	6.98E-05	1.30E-05	4.48E-06	1.30E-05
Th-229	6.42E-08	2.40E-08	5.17E-09	1.55E-08	1.37E-10	8.38E-09	1.56E-09	5.38E-10	1.56E-09
Th-230	2.53E-05	9.45E-06	2.04E-06	6.09E-06	5.40E-08	3.30E-06	6.16E-07	2.12E-07	6.15E-07
Th-232	1.33E-04	4.97E-05	1.07E-05	3.20E-05	2.84E-07	1.74E-05	3.24E-06	1.11E-06	3.23E-06
Pa-231	8.55E-06	3.19E-06	6.88E-07	2.06E-06	1.82E-08	1.12E-06	2.08E-07	7.16E-08	2.08E-07
U-232	5.86E-04	2.19E-04	4.71E-05	1.41E-04	1.25E-06	7.64E-05	1.42E-05	4.90E-06	1.42E-05
U-233	4.75E-05	1.77E-05	3.82E-06	1.14E-05	1.01E-07	6.19E-06	1.15E-06	3.98E-07	1.15E-06
U-234	3.10E-01	1.16E-01	2.49E-02	7.46E-02	6.61E-04	4.04E-02	7.53E-03	2.59E-03	7.53E-03
U-235	1.26E-02	4.72E-03	1.02E-03	3.04E-03	2.70E-05	1.65E-03	3.07E-04	1.06E-04	3.07E-04
U-236	2.00E-02	7.45E-03	1.61E-03	4.80E-03	4.26E-05	2.60E-03	4.85E-04	1.67E-04	4.85E-04
U-238	2.43E-03	9.06E-04	1.95E-04	5.84E-04	5.18E-06	3.16E-04	5.90E-05	2.03E-05	5.90E-05
Np-237	4.13E-03	1.54E-03	3.32E-04	9.94E-04	8.81E-06	5.38E-04	1.00E-04	3.46E-05	1.00E-04
Pu-238	2.13E+00	7.96E-01	1.72E-01	5.13E-01	4.55E-03	2.78E-01	5.18E-02	1.78E-02	5.18E-02
Pu-239	8.50E+01	3.17E+01	6.84E+00	2.05E+01	1.81E-01	1.11E+01	2.07E+00	7.12E-01	2.07E+00
Pu-240	1.30E+00	4.86E-01	1.05E-01	3.13E-01	2.78E-03	1.70E-01	3.16E-02	1.09E-02	3.16E-02
Pu-241	2.24E+01	8.36E+00	1.80E+00	5.39E+00	4.78E-02	2.92E+00	5.44E-01	1.87E-01	5.44E-01
Pu-242	3.58E-04	1.34E-04	2.88E-05	8.62E-05	7.64E-07	4.67E-05	8.71E-06	3.00E-06	8.70E-06
Pu-244	2.37E-13	8.84E-14	1.91E-14	5.70E-14	5.05E-16	3.09E-14	5.76E-15	1.98E-15	5.75E-15
Am-241	5.61E-01	2.09E-01	4.51E-02	1.35E-01	1.20E-03	7.31E-02	1.36E-02	4.69E-03	1.36E-02
Am-243	3.03E-04	1.13E-04	2.44E-05	7.30E-05	6.47E-07	3.95E-05	7.37E-06	2.54E-06	7.37E-06
Cm-243	8.63E-05	3.22E-05	6.95E-06	2.08E-05	1.84E-07	1.13E-05	2.10E-06	7.23E-07	2.10E-06
Cm-244	2.74E-03	1.02E-03	2.20E-04	6.59E-04	5.84E-06	3.57E-04	6.66E-05	2.29E-05	6.65E-05
Cm-245	1.34E-07	5.02E-08	1.08E-08	3.24E-08	2.87E-10	1.75E-08	3.27E-09	1.13E-09	3.27E-09
Cm-246	1.26E-09	4.69E-10	1.01E-10	3.03E-10	2.68E-12	1.64E-10	3.06E-11	1.05E-11	3.05E-11
Cm-247	1.13E-15	4.23E-16	9.11E-17	2.72E-16	2.41E-18	1.48E-16	2.75E-17	9.47E-18	2.75E-17
Cm-248	2.10E-16	7.85E-17	1.69E-17	5.06E-17	4.49E-19	2.74E-17	5.11E-18	1.76E-18	5.11E-18
Totals =	9.22E+03	3.44E+03	7.42E+02	2.22E+03	1.97E+01	1.20E+03	2.24E+02	7.72E+01	2.24E+02

Table B-24 (Part 3). Best-estimate inventory for waste stream ANL-MOD-5H (1960 through 1983).

Cs-137 Ci =	75.67	10.36	6.15	6.97	8.46	15.16	5.27	Total
Nuclide	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1960–1983 (Ci)
H-3	3.71E-01	5.08E-02	3.02E-02	3.42E-02	4.15E-02	7.44E-02	2.59E-02	6.83E+01
C-14	2.53E-04	3.46E-05	2.06E-05	2.33E-05	2.83E-05	5.06E-05	1.76E-05	4.65E-02
Cl-36	3.12E-07	4.27E-08	2.54E-08	2.87E-08	3.49E-08	6.25E-08	2.17E-08	5.74E-05
Co-60	1.45E+00	1.99E-01	1.18E-01	1.33E-01	1.62E-01	2.90E-01	1.01E-01	2.67E+02
Ni-59	7.58E-04	1.04E-04	6.16E-05	6.98E-05	8.47E-05	1.52E-04	5.28E-05	1.39E-01
Ni-63	2.92E-02	4.00E-03	2.38E-03	2.69E-03	3.27E-03	5.86E-03	2.04E-03	5.38E+00
Sr-90	5.47E+01	7.49E+00	4.45E+00	5.04E+00	6.11E+00	1.10E+01	3.81E+00	1.01E+04
Nb-94	4.17E-05	5.71E-06	3.39E-06	3.84E-06	4.66E-06	8.36E-06	2.91E-06	7.68E-03
Tc-99	9.25E-03	1.27E-03	7.52E-04	8.52E-04	1.03E-03	1.85E-03	6.45E-04	1.70E+00
I-129	1.91E-05	2.62E-06	1.55E-06	1.76E-06	2.13E-06	3.83E-06	1.33E-06	3.51E-03
Cs-137	7.57E+01	1.04E+01	6.15E+00	6.97E+00	8.46E+00	1.52E+01	5.27E+00	1.39E+04
Eu-152	3.84E-03	5.26E-04	3.12E-04	3.54E-04	4.30E-04	7.70E-04	2.68E-04	7.07E-01
Eu-154	4.01E-01	5.49E-02	3.26E-02	3.69E-02	4.48E-02	8.03E-02	2.79E-02	7.38E+01
Pb-210	8.71E-11	1.19E-11	7.08E-12	8.03E-12	9.74E-12	1.75E-11	6.07E-12	1.60E-08
Ra-226	8.13E-10	1.11E-10	6.61E-11	7.49E-11	9.09E-11	1.63E-10	5.66E-11	1.50E-07
Ra-228	9.16E-14	1.25E-14	7.44E-15	8.43E-15	1.02E-14	1.83E-14	6.38E-15	1.68E-11
Ac-227	2.69E-08	3.68E-09	2.18E-09	2.47E-09	3.00E-09	5.38E-09	1.87E-09	4.94E-06
Th-228	7.90E-06	1.08E-06	6.42E-07	7.27E-07	8.83E-07	1.58E-06	5.50E-07	1.45E-03
Th-229	9.47E-10	1.30E-10	7.70E-11	8.72E-11	1.06E-10	1.90E-10	6.60E-11	1.74E-07
Th-230	3.73E-07	5.11E-08	3.03E-08	3.44E-08	4.17E-08	7.48E-08	2.60E-08	6.87E-05
Th-232	1.96E-06	2.69E-07	1.60E-07	1.81E-07	2.19E-07	3.93E-07	1.37E-07	3.61E-04
Pa-231	1.26E-07	1.73E-08	1.02E-08	1.16E-08	1.41E-08	2.53E-08	8.78E-09	2.32E-05
U-232	8.64E-06	1.18E-06	7.02E-07	7.95E-07	9.65E-07	1.73E-06	6.02E-07	1.59E-03
U-233	7.00E-07	9.59E-08	5.69E-08	6.45E-08	7.83E-08	1.40E-07	4.88E-08	1.29E-04
U-234	4.57E-03	6.25E-04	3.71E-04	4.21E-04	5.11E-04	9.15E-04	3.18E-04	8.40E-01
U-235	1.86E-04	2.55E-05	1.51E-05	1.72E-05	2.08E-05	3.73E-05	1.30E-05	3.43E-02
U-236	2.94E-04	4.03E-05	2.39E-05	2.71E-05	3.29E-05	5.89E-05	2.05E-05	5.41E-02
U-238	3.58E-05	4.90E-06	2.91E-06	3.29E-06	4.00E-06	7.17E-06	2.49E-06	6.58E-03
Np-237	6.09E-05	8.34E-06	4.95E-06	5.61E-06	6.80E-06	1.22E-05	4.24E-06	1.12E-02
Pu-238	3.14E-02	4.30E-03	2.55E-03	2.89E-03	3.51E-03	6.29E-03	2.19E-03	5.78E+00
Pu-239	1.25E+00	1.72E-01	1.02E-01	1.15E-01	1.40E-01	2.51E-01	8.73E-02	2.31E+02
Pu-240	1.92E-02	2.63E-03	1.56E-03	1.77E-03	2.14E-03	3.84E-03	1.34E-03	3.53E+00
Pu-241	3.30E-01	4.52E-02	2.68E-02	3.04E-02	3.69E-02	6.61E-02	2.30E-02	6.07E+01
Pu-242	5.28E-06	7.23E-07	4.29E-07	4.86E-07	5.90E-07	1.06E-06	3.68E-07	9.71E-04
Pu-244	3.49E-15	4.78E-16	2.84E-16	3.21E-16	3.90E-16	6.99E-16	2.43E-16	6.42E-13
Am-241	8.27E-03	1.13E-03	6.72E-04	7.61E-04	9.24E-04	1.66E-03	5.76E-04	1.52E+00
Am-243	4.47E-06	6.12E-07	3.63E-07	4.12E-07	5.00E-07	8.95E-07	3.11E-07	8.22E-04
Cm-243	1.27E-06	1.74E-07	1.03E-07	1.17E-07	1.42E-07	2.55E-07	8.87E-08	2.34E-04
Cm-244	4.04E-05	5.53E-06	3.28E-06	3.72E-06	4.51E-06	8.09E-06	2.81E-06	7.43E-03
Cm-245	1.98E-09	2.71E-10	1.61E-10	1.83E-10	2.22E-10	3.97E-10	1.38E-10	3.65E-07
Cm-246	1.85E-11	2.54E-12	1.51E-12	1.71E-12	2.07E-12	3.71E-12	1.29E-12	3.41E-09
Cm-247	1.67E-17	2.28E-18	1.36E-18	1.54E-18	1.87E-18	3.34E-18	1.16E-18	3.07E-15
Cm-248	3.10E-18	4.25E-19	2.52E-19	2.86E-19	3.47E-19	6.21E-19	2.16E-19	5.70E-16
Totals =	1.36E+02	1.86E+01	1.10E+01	1.25E+01	1.52E+01	2.72E+01	9.47E+00	2.50E+04

File = "NEW General Plant Waste.xls"

Table B-25. Lower-bound inventory for the general plant waste stream ANL-MOD-5H (1960 through 1983).

BE Cs-137 Ci =	0.38	17.50	68.13	0.75	86.88	96.63	1099.41	2752.14	
Minimum Scaling Factor		1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)
Nuclide	(Ci/Cs-137)								
H-3	9.84E-04	3.68E-04	1.72E-02	6.68E-02	7.36E-04	8.52E-02	9.48E-02	1.08E+00	2.70E+00
C-14	6.68E-07	2.51E-07	1.17E-05	4.55E-05	5.01E-07	5.81E-05	6.46E-05	7.35E-04	1.84E-03
Cl-36	4.12E-11	1.55E-11	7.22E-10	2.81E-09	3.09E-11	3.58E-09	3.99E-09	4.53E-08	1.14E-07
Co-60	1.91E-03	7.18E-04	3.35E-02	1.30E-01	1.44E-03	1.66E-01	1.85E-01	2.11E+00	5.27E+00
Ni-59	1.00E-06	3.76E-07	1.75E-05	6.82E-05	7.51E-07	8.70E-05	9.68E-05	1.10E-03	2.76E-03
Ni-63	1.93E-04	7.24E-05	3.38E-03	1.32E-02	1.45E-04	1.68E-02	1.87E-02	2.12E-01	5.32E-01
Sr-90	3.61E-01	1.36E-01	6.33E+00	2.46E+01	2.71E-01	3.14E+01	3.49E+01	3.97E+02	9.95E+02
Nb-94	1.84E-07	6.89E-08	3.22E-06	1.25E-05	1.38E-07	1.60E-05	1.78E-05	2.02E-04	5.06E-04
Tc-99	6.11E-05	2.29E-05	1.07E-03	4.16E-03	4.58E-05	5.31E-03	5.91E-03	6.72E-02	1.68E-01
I-129	1.26E-07	4.73E-08	2.21E-06	8.60E-06	9.46E-08	1.10E-05	1.22E-05	1.39E-04	3.47E-04
Cs-137	5.00E-01	1.88E-01	8.75E+00	3.41E+01	3.75E-01	4.34E+01	4.83E+01	5.50E+02	1.38E+03
Eu-152	1.02E-05	3.81E-06	1.78E-04	6.92E-04	7.62E-06	8.83E-04	9.82E-04	1.12E-02	2.80E-02
Eu-154	1.06E-03	3.97E-04	1.85E-02	7.22E-02	7.95E-04	9.21E-02	1.02E-01	1.17E+00	2.92E+00
Pb-210	1.15E-13	4.32E-14	2.02E-12	7.85E-12	8.64E-14	1.00E-11	1.11E-11	1.27E-10	3.17E-10
Ra-226	5.37E-13	2.01E-13	9.40E-12	3.66E-11	4.03E-13	4.67E-11	5.19E-11	5.91E-10	1.48E-09
Ra-228	1.21E-17	4.54E-18	2.12E-16	8.24E-16	9.08E-18	1.05E-15	1.17E-15	1.33E-14	3.33E-14
Ac-227	1.77E-11	6.65E-12	3.11E-10	1.21E-09	1.33E-11	1.54E-09	1.71E-09	1.95E-08	4.88E-08
Th-228	2.09E-09	7.83E-10	3.65E-08	1.42E-07	1.57E-09	1.81E-07	2.02E-07	2.29E-06	5.74E-06
Th-229	4.17E-12	1.56E-12	7.30E-11	2.84E-10	3.13E-12	3.62E-10	4.03E-10	4.59E-09	1.15E-08
Th-230	2.47E-09	9.25E-10	4.32E-08	1.68E-07	1.85E-09	2.14E-07	2.38E-07	2.71E-06	6.79E-06
Th-232	5.19E-09	1.95E-09	9.08E-08	3.53E-07	3.89E-09	4.51E-07	5.01E-07	5.70E-06	1.43E-05
Pa-231	3.33E-10	1.25E-10	5.83E-09	2.27E-08	2.50E-10	2.90E-08	3.22E-08	3.66E-07	9.17E-07
U-232	5.71E-08	2.14E-08	9.99E-07	3.89E-06	4.28E-08	4.96E-06	5.51E-06	6.27E-05	1.57E-04
U-233	4.63E-09	1.73E-09	8.10E-08	3.15E-07	3.47E-09	4.02E-07	4.47E-07	5.09E-06	1.27E-05
U-234	3.02E-05	1.13E-05	5.28E-04	2.06E-03	2.26E-05	2.62E-03	2.92E-03	3.32E-02	8.31E-02
U-235	2.24E-06	8.39E-07	3.92E-05	1.53E-04	1.68E-06	1.94E-04	2.16E-04	2.46E-03	6.16E-03
U-236	1.94E-06	7.29E-07	3.40E-05	1.32E-04	1.46E-06	1.69E-04	1.88E-04	2.14E-03	5.35E-03
U-238	2.36E-07	8.87E-08	4.14E-06	1.61E-05	1.77E-07	2.05E-05	2.28E-05	2.60E-04	6.51E-04
Np-237	4.02E-07	1.51E-07	7.04E-06	2.74E-05	3.02E-07	3.49E-05	3.89E-05	4.42E-04	1.11E-03
Pu-238	1.38E-04	5.19E-05	2.42E-03	9.43E-03	1.04E-04	1.20E-02	1.34E-02	1.52E-01	3.81E-01
Pu-239	8.28E-03	3.11E-03	1.45E-01	5.64E-01	6.21E-03	7.20E-01	8.00E-01	9.11E+00	2.28E+01
Pu-240	2.54E-05	9.51E-06	4.44E-04	1.73E-03	1.90E-05	2.20E-03	2.45E-03	2.79E-02	6.98E-02
Pu-241	8.72E-05	3.27E-05	1.53E-03	5.94E-03	6.54E-05	7.58E-03	8.43E-03	9.59E-02	2.40E-01
Pu-242	6.97E-09	2.62E-09	1.22E-07	4.75E-07	5.23E-09	6.06E-07	6.74E-07	7.67E-06	1.92E-05
Pu-244	4.61E-18	1.73E-18	8.07E-17	3.14E-16	3.46E-18	4.01E-16	4.46E-16	5.07E-15	1.27E-14
Am-241	1.09E-05	4.10E-06	1.91E-04	7.44E-04	8.19E-06	9.49E-04	1.06E-03	1.20E-02	3.01E-02
Am-243	1.18E-09	4.43E-10	2.07E-08	8.05E-08	8.86E-10	1.03E-07	1.14E-07	1.30E-06	3.25E-06
Cm-243	3.36E-10	1.26E-10	5.89E-09	2.29E-08	2.52E-10	2.92E-08	3.25E-08	3.70E-07	9.26E-07
Cm-244	5.34E-09	2.00E-09	9.34E-08	3.64E-07	4.00E-09	4.64E-07	5.16E-07	5.87E-06	1.47E-05
Cm-245	5.24E-13	1.96E-13	9.17E-12	3.57E-11	3.93E-13	4.55E-11	5.06E-11	5.76E-10	1.44E-09
Cm-246	4.90E-15	1.84E-15	8.57E-14	3.34E-13	3.67E-15	4.26E-13	4.73E-13	5.39E-12	1.35E-11
Cm-247	1.10E-20	4.13E-21	1.93E-19	7.51E-19	8.27E-21	9.58E-19	1.07E-18	1.21E-17	3.03E-17
Cm-248	4.10E-21	1.54E-21	7.17E-20	2.79E-19	3.07E-21	3.56E-19	3.96E-19	4.50E-18	1.13E-17
Totals =		3.30E-01	1.54E+01	6.00E+01	6.60E-01	7.65E+01	8.51E+01	9.68E+02	2.42E+03

Table B-25 (Part 2). Lower-bound inventory for waste stream ANL-MOD-5H (1960 through 1983).

Cs-137 Ci =	5132.18	1916.23	413.10	1235.27	10.95	669.27	124.81	42.97	124.68
Nuclide	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)
H-3	5.04E+00	1.88E+00	4.05E-01	1.21E+00	1.07E-02	6.57E-01	1.22E-01	4.22E-02	1.22E-01
C-14	3.43E-03	1.28E-03	2.76E-04	8.25E-04	7.32E-06	4.47E-04	8.34E-05	2.87E-05	8.33E-05
Cl-36	2.12E-07	7.90E-08	1.70E-08	5.10E-08	4.52E-10	2.76E-08	5.15E-09	1.77E-09	5.14E-09
Co-60	9.83E+00	3.67E+00	7.91E-01	2.37E+00	2.10E-02	1.28E+00	2.39E-01	8.23E-02	2.39E-01
Ni-59	5.14E-03	1.92E-03	4.14E-04	1.24E-03	1.10E-05	6.70E-04	1.25E-04	4.30E-05	1.25E-04
Ni-63	9.92E-01	3.70E-01	7.98E-02	2.39E-01	2.12E-03	1.29E-01	2.41E-02	8.30E-03	2.41E-02
Sr-90	1.86E+03	6.93E+02	1.49E+02	4.47E+02	3.96E+00	2.42E+02	4.51E+01	1.55E+01	4.51E+01
Nb-94	9.43E-04	3.52E-04	7.59E-05	2.27E-04	2.01E-06	1.23E-04	2.29E-05	7.90E-06	2.29E-05
Tc-99	3.14E-01	1.17E-01	2.53E-02	7.55E-02	6.69E-04	4.09E-02	7.63E-03	2.63E-03	7.62E-03
I-129	6.48E-04	2.42E-04	5.21E-05	1.56E-04	1.38E-06	8.44E-05	1.57E-05	5.42E-06	1.57E-05
Cs-137	2.57E+03	9.58E+02	2.07E+02	6.18E+02	5.47E+00	3.35E+02	6.24E+01	2.15E+01	6.23E+01
Eu-152	5.21E-02	1.95E-02	4.20E-03	1.25E-02	1.11E-04	6.80E-03	1.27E-03	4.37E-04	1.27E-03
Eu-154	5.44E+00	2.03E+00	4.38E-01	1.31E+00	1.16E-02	7.09E-01	1.32E-01	4.55E-02	1.32E-01
Pb-210	5.91E-10	2.21E-10	4.76E-11	1.42E-10	1.26E-12	7.71E-11	1.44E-11	4.95E-12	1.44E-11
Ra-226	2.76E-09	1.03E-09	2.22E-10	6.64E-10	5.88E-12	3.60E-10	6.70E-11	2.31E-11	6.70E-11
Ra-228	6.21E-14	2.32E-14	5.00E-15	1.49E-14	1.32E-16	8.10E-15	1.51E-15	5.20E-16	1.51E-15
Ac-227	9.11E-08	3.40E-08	7.33E-09	2.19E-08	1.94E-10	1.19E-08	2.21E-09	7.62E-10	2.21E-09
Th-228	1.07E-05	4.00E-06	8.62E-07	2.58E-06	2.29E-08	1.40E-06	2.61E-07	8.97E-08	2.60E-07
Th-229	2.14E-08	7.99E-09	1.72E-09	5.15E-09	4.57E-11	2.79E-09	5.21E-10	1.79E-10	5.20E-10
Th-230	1.27E-05	4.73E-06	1.02E-06	3.05E-06	2.70E-08	1.65E-06	3.08E-07	1.06E-07	3.08E-07
Th-232	2.66E-05	9.94E-06	2.14E-06	6.41E-06	5.68E-08	3.47E-06	6.48E-07	2.23E-07	6.47E-07
Pa-231	1.71E-06	6.39E-07	1.38E-07	4.12E-07	3.65E-09	2.23E-07	4.16E-08	1.43E-08	4.15E-08
U-232	2.93E-04	1.09E-04	2.36E-05	7.05E-05	6.25E-07	3.82E-05	7.12E-06	2.45E-06	7.11E-06
U-233	2.37E-05	8.86E-06	1.91E-06	5.71E-06	5.06E-08	3.10E-06	5.77E-07	1.99E-07	5.77E-07
U-234	1.55E-01	5.78E-02	1.25E-02	3.73E-02	3.30E-04	2.02E-02	3.77E-03	1.30E-03	3.76E-03
U-235	1.15E-02	4.29E-03	9.25E-04	2.77E-03	2.45E-05	1.50E-03	2.79E-04	9.62E-05	2.79E-04
U-236	9.98E-03	3.72E-03	8.03E-04	2.40E-03	2.13E-05	1.30E-03	2.43E-04	8.35E-05	2.42E-04
U-238	1.21E-03	4.53E-04	9.77E-05	2.92E-04	2.59E-06	1.58E-04	2.95E-05	1.02E-05	2.95E-05
Np-237	2.06E-03	7.71E-04	1.66E-04	4.97E-04	4.40E-06	2.69E-04	5.02E-05	1.73E-05	5.02E-05
Pu-238	7.10E-01	2.65E-01	5.72E-02	1.71E-01	1.52E-03	9.26E-02	1.73E-02	5.95E-03	1.73E-02
Pu-239	4.25E+01	1.59E+01	3.42E+00	1.02E+01	9.07E-02	5.54E+00	1.03E+00	3.56E-01	1.03E+00
Pu-240	1.30E-01	4.86E-02	1.05E-02	3.13E-02	2.78E-04	1.70E-02	3.16E-03	1.09E-03	3.16E-03
Pu-241	4.48E-01	1.67E-01	3.60E-02	1.08E-01	9.55E-04	5.84E-02	1.09E-02	3.75E-03	1.09E-02
Pu-242	3.58E-05	1.34E-05	2.88E-06	8.62E-06	7.64E-08	4.67E-06	8.71E-07	3.00E-07	8.70E-07
Pu-244	2.37E-14	8.84E-15	1.91E-15	5.70E-15	5.05E-17	3.09E-15	5.76E-16	1.98E-16	5.75E-16
Am-241	5.61E-02	2.09E-02	4.51E-03	1.35E-02	1.20E-04	7.31E-03	1.36E-03	4.69E-04	1.36E-03
Am-243	6.06E-06	2.26E-06	4.88E-07	1.46E-06	1.29E-08	7.91E-07	1.47E-07	5.08E-08	1.47E-07
Cm-243	1.73E-06	6.45E-07	1.39E-07	4.16E-07	3.68E-09	2.25E-07	4.20E-08	1.45E-08	4.19E-08
Cm-244	2.74E-05	1.02E-05	2.20E-06	6.59E-06	5.84E-08	3.57E-06	6.66E-07	2.29E-07	6.65E-07
Cm-245	2.69E-09	1.00E-09	2.16E-10	6.47E-10	5.74E-12	3.51E-10	6.54E-11	2.25E-11	6.53E-11
Cm-246	2.51E-11	9.39E-12	2.02E-12	6.05E-12	5.36E-14	3.28E-12	6.11E-13	2.10E-13	6.11E-13
Cm-247	5.66E-17	2.11E-17	4.55E-18	1.36E-17	1.21E-19	7.38E-18	1.38E-18	4.74E-19	1.37E-18
Cm-248	2.10E-17	7.85E-18	1.69E-18	5.06E-18	4.49E-20	2.74E-18	5.11E-19	1.76E-19	5.11E-19
Totals =	4.52E+03	1.69E+03	3.64E+02	1.09E+03	9.64E+00	5.89E+02	1.10E+02	3.78E+01	1.10E+02

Table B-25 (Part 2). Lower-bound inventory for waste stream ANL-MOD-5H (1960 through 1983).

Cs-137 Ci =	5132.18	1916.23	413.10	1235.27	10.95	669.27	124.81	42.97	124.68
Nuclide	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)
H-3	5.04E+00	1.88E+00	4.05E-01	1.21E+00	1.07E-02	6.57E-01	1.22E-01	4.22E-02	1.22E-01
C-14	3.43E-03	1.28E-03	2.76E-04	8.25E-04	7.32E-06	4.47E-04	8.34E-05	2.87E-05	8.33E-05
Cl-36	2.12E-07	7.90E-08	1.70E-08	5.10E-08	4.52E-10	2.76E-08	5.15E-09	1.77E-09	5.14E-09
Co-60	9.83E+00	3.67E+00	7.91E-01	2.37E+00	2.10E-02	1.28E+00	2.39E-01	8.23E-02	2.39E-01
Ni-59	5.14E-03	1.92E-03	4.14E-04	1.24E-03	1.10E-05	6.70E-04	1.25E-04	4.30E-05	1.25E-04
Ni-63	9.92E-01	3.70E-01	7.98E-02	2.39E-01	2.12E-03	1.29E-01	2.41E-02	8.30E-03	2.41E-02
Sr-90	1.86E+03	6.93E+02	1.49E+02	4.47E+02	3.96E+00	2.42E+02	4.51E+01	1.55E+01	4.51E+01
Nb-94	9.43E-04	3.52E-04	7.59E-05	2.27E-04	2.01E-06	1.23E-04	2.29E-05	7.90E-06	2.29E-05
Tc-99	3.14E-01	1.17E-01	2.53E-02	7.55E-02	6.69E-04	4.09E-02	7.63E-03	2.63E-03	7.62E-03
I-129	6.48E-04	2.42E-04	5.21E-05	1.56E-04	1.38E-06	8.44E-05	1.57E-05	5.42E-06	1.57E-05
Cs-137	2.57E+03	9.58E+02	2.07E+02	6.18E+02	5.47E+00	3.35E+02	6.24E+01	2.15E+01	6.23E+01
Eu-152	5.21E-02	1.95E-02	4.20E-03	1.25E-02	1.11E-04	6.80E-03	1.27E-03	4.37E-04	1.27E-03
Eu-154	5.44E+00	2.03E+00	4.38E-01	1.31E+00	1.16E-02	7.09E-01	1.32E-01	4.55E-02	1.32E-01
Pb-210	5.91E-10	2.21E-10	4.76E-11	1.42E-10	1.26E-12	7.71E-11	1.44E-11	4.95E-12	1.44E-11
Ra-226	2.76E-09	1.03E-09	2.22E-10	6.64E-10	5.88E-12	3.60E-10	6.70E-11	2.31E-11	6.70E-11
Ra-228	6.21E-14	2.32E-14	5.00E-15	1.49E-14	1.32E-16	8.10E-15	1.51E-15	5.20E-16	1.51E-15
Ac-227	9.11E-08	3.40E-08	7.33E-09	2.19E-08	1.94E-10	1.19E-08	2.21E-09	7.62E-10	2.21E-09
Th-228	1.07E-05	4.00E-06	8.62E-07	2.58E-06	2.29E-08	1.40E-06	2.61E-07	8.97E-08	2.60E-07
Th-229	2.14E-08	7.99E-09	1.72E-09	5.15E-09	4.57E-11	2.79E-09	5.21E-10	1.79E-10	5.20E-10
Th-230	1.27E-05	4.73E-06	1.02E-06	3.05E-06	2.70E-08	1.65E-06	3.08E-07	1.06E-07	3.08E-07
Th-232	2.66E-05	9.94E-06	2.14E-06	6.41E-06	5.68E-08	3.47E-06	6.48E-07	2.23E-07	6.47E-07
Pa-231	1.71E-06	6.39E-07	1.38E-07	4.12E-07	3.65E-09	2.23E-07	4.16E-08	1.43E-08	4.15E-08
U-232	2.93E-04	1.09E-04	2.36E-05	7.05E-05	6.25E-07	3.82E-05	7.12E-06	2.45E-06	7.11E-06
U-233	2.37E-05	8.86E-06	1.91E-06	5.71E-06	5.06E-08	3.10E-06	5.77E-07	1.99E-07	5.77E-07
U-234	1.55E-01	5.78E-02	1.25E-02	3.73E-02	3.30E-04	2.02E-02	3.77E-03	1.30E-03	3.76E-03
U-235	1.15E-02	4.29E-03	9.25E-04	2.77E-03	2.45E-05	1.50E-03	2.79E-04	9.62E-05	2.79E-04
U-236	9.98E-03	3.72E-03	8.03E-04	2.40E-03	2.13E-05	1.30E-03	2.43E-04	8.35E-05	2.42E-04
U-238	1.21E-03	4.53E-04	9.77E-05	2.92E-04	2.59E-06	1.58E-04	2.95E-05	1.02E-05	2.95E-05
Np-237	2.06E-03	7.71E-04	1.66E-04	4.97E-04	4.40E-06	2.69E-04	5.02E-05	1.73E-05	5.02E-05
Pu-238	7.10E-01	2.65E-01	5.72E-02	1.71E-01	1.52E-03	9.26E-02	1.73E-02	5.95E-03	1.73E-02
Pu-239	4.25E+01	1.59E+01	3.42E+00	1.02E+01	9.07E-02	5.54E+00	1.03E+00	3.56E-01	1.03E+00
Pu-240	1.30E-01	4.86E-02	1.05E-02	3.13E-02	2.78E-04	1.70E-02	3.16E-03	1.09E-03	3.16E-03
Pu-241	4.48E-01	1.67E-01	3.60E-02	1.08E-01	9.55E-04	5.84E-02	1.09E-02	3.75E-03	1.09E-02
Pu-242	3.58E-05	1.34E-05	2.88E-06	8.62E-06	7.64E-08	4.67E-06	8.71E-07	3.00E-07	8.70E-07
Pu-244	2.37E-14	8.84E-15	1.91E-15	5.70E-15	5.05E-17	3.09E-15	5.76E-16	1.98E-16	5.75E-16
Am-241	5.61E-02	2.09E-02	4.51E-03	1.35E-02	1.20E-04	7.31E-03	1.36E-03	4.69E-04	1.36E-03
Am-243	6.06E-06	2.26E-06	4.88E-07	1.46E-06	1.29E-08	7.91E-07	1.47E-07	5.08E-08	1.47E-07
Cm-243	1.73E-06	6.45E-07	1.39E-07	4.16E-07	3.68E-09	2.25E-07	4.20E-08	1.45E-08	4.19E-08
Cm-244	2.74E-05	1.02E-05	2.20E-06	6.59E-06	5.84E-08	3.57E-06	6.66E-07	2.29E-07	6.65E-07
Cm-245	2.69E-09	1.00E-09	2.16E-10	6.47E-10	5.74E-12	3.51E-10	6.54E-11	2.25E-11	6.53E-11
Cm-246	2.51E-11	9.39E-12	2.02E-12	6.05E-12	5.36E-14	3.28E-12	6.11E-13	2.10E-13	6.11E-13
Cm-247	5.66E-17	2.11E-17	4.55E-18	1.36E-17	1.21E-19	7.38E-18	1.38E-18	4.74E-19	1.37E-18
Cm-248	2.10E-17	7.85E-18	1.69E-18	5.06E-18	4.49E-20	2.74E-18	5.11E-19	1.76E-19	5.11E-19
Totals =	4.52E+03	1.69E+03	3.64E+02	1.09E+03	9.64E+00	5.89E+02	1.10E+02	3.78E+01	1.10E+02

Table B-25 (Part 3). Lower-bound inventory for waste stream ANL-MOD-5H (1960 through 1983).

Cs-137 Ci =	75.67	10.36	6.15	6.97	8.46	15.16	5.27	Total
	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1960–1983 (Ci)
H-3	7.42E-02	1.02E-02	6.03E-03	6.84E-03	8.30E-03	1.49E-02	5.17E-03	1.37E+01
C-14	5.06E-05	6.93E-06	4.11E-06	4.66E-06	5.65E-06	1.01E-05	3.52E-06	9.30E-03
Cl-36	3.12E-09	4.27E-10	2.54E-10	2.87E-10	3.49E-10	6.25E-10	2.17E-10	5.74E-07
Co-60	1.45E-01	1.99E-02	1.18E-02	1.33E-02	1.62E-02	2.90E-02	1.01E-02	2.67E+01
Ni-59	7.58E-05	1.04E-05	6.16E-06	6.98E-06	8.47E-06	1.52E-05	5.28E-06	1.39E-02
Ni-63	1.46E-02	2.00E-03	1.19E-03	1.35E-03	1.63E-03	2.93E-03	1.02E-03	2.69E+00
Sr-90	2.74E+01	3.75E+00	2.22E+00	2.52E+00	3.06E+00	5.48E+00	1.91E+00	5.03E+03
Nb-94	1.39E-05	1.90E-06	1.13E-06	1.28E-06	1.55E-06	2.79E-06	9.69E-07	2.56E-03
Tc-99	4.63E-03	6.33E-04	3.76E-04	4.26E-04	5.17E-04	9.27E-04	3.22E-04	8.51E-01
I-129	9.55E-06	1.31E-06	7.76E-07	8.79E-07	1.07E-06	1.91E-06	6.65E-07	1.76E-03
Cs-137	3.78E+01	5.18E+00	3.08E+00	3.48E+00	4.23E+00	7.58E+00	2.64E+00	6.96E+03
Eu-152	7.69E-04	1.05E-04	6.25E-05	7.08E-05	8.59E-05	1.54E-04	5.36E-05	1.41E-01
Eu-154	8.02E-02	1.10E-02	6.52E-03	7.39E-03	8.97E-03	1.61E-02	5.59E-03	1.48E+01
Pb-210	8.71E-12	1.19E-12	7.08E-13	8.03E-13	9.74E-13	1.75E-12	6.07E-13	1.60E-09
Ra-226	4.06E-11	5.57E-12	3.30E-12	3.74E-12	4.54E-12	8.14E-12	2.83E-12	7.48E-09
Ra-228	9.16E-16	1.25E-16	7.44E-17	8.43E-17	1.02E-16	1.83E-16	6.38E-17	1.68E-13
Ac-227	1.34E-09	1.84E-10	1.09E-10	1.24E-10	1.50E-10	2.69E-10	9.35E-11	2.47E-07
Th-228	1.58E-07	2.16E-08	1.28E-08	1.45E-08	1.77E-08	3.16E-08	1.10E-08	2.91E-05
Th-229	3.16E-10	4.32E-11	2.57E-11	2.91E-11	3.53E-11	6.32E-11	2.20E-11	5.81E-08
Th-230	1.87E-07	2.56E-08	1.52E-08	1.72E-08	2.09E-08	3.74E-08	1.30E-08	3.43E-05
Th-232	3.93E-07	5.38E-08	3.19E-08	3.62E-08	4.39E-08	7.87E-08	2.74E-08	7.22E-05
Pa-231	2.52E-08	3.45E-09	2.05E-09	2.32E-09	2.82E-09	5.05E-09	1.76E-09	4.64E-06
U-232	4.32E-06	5.91E-07	3.51E-07	3.98E-07	4.83E-07	8.65E-07	3.01E-07	7.94E-04
U-233	3.50E-07	4.79E-08	2.85E-08	3.22E-08	3.91E-08	7.01E-08	2.44E-08	6.44E-05
U-234	2.28E-03	3.13E-04	1.86E-04	2.10E-04	2.55E-04	4.57E-04	1.59E-04	4.20E-01
U-235	1.69E-04	2.32E-05	1.38E-05	1.56E-05	1.89E-05	3.39E-05	1.18E-05	3.12E-02
U-236	1.47E-04	2.01E-05	1.20E-05	1.35E-05	1.64E-05	2.95E-05	1.02E-05	2.71E-02
U-238	1.79E-05	2.45E-06	1.45E-06	1.65E-06	2.00E-06	3.58E-06	1.25E-06	3.29E-03
Np-237	3.04E-05	4.17E-06	2.47E-06	2.80E-06	3.40E-06	6.10E-06	2.12E-06	5.60E-03
Pu-238	1.05E-02	1.43E-03	8.51E-04	9.65E-04	1.17E-03	2.10E-03	7.30E-04	1.93E+00
Pu-239	6.27E-01	8.58E-02	5.09E-02	5.77E-02	7.01E-02	1.26E-01	4.37E-02	1.15E+02
Pu-240	1.92E-03	2.63E-04	1.56E-04	1.77E-04	2.14E-04	3.84E-04	1.34E-04	3.53E-01
Pu-241	6.60E-03	9.04E-04	5.37E-04	6.08E-04	7.38E-04	1.32E-03	4.60E-04	1.21E+00
Pu-242	5.28E-07	7.23E-08	4.29E-08	4.86E-08	5.90E-08	1.06E-07	3.68E-08	9.71E-05
Pu-244	3.49E-16	4.78E-17	2.84E-17	3.21E-17	3.90E-17	6.99E-17	2.43E-17	6.42E-14
Am-241	8.27E-04	1.13E-04	6.72E-05	7.61E-05	9.24E-05	1.66E-04	5.76E-05	1.52E-01
Am-243	8.94E-08	1.22E-08	7.27E-09	8.23E-09	9.99E-09	1.79E-08	6.23E-09	1.64E-05
Cm-243	2.55E-08	3.49E-09	2.07E-09	2.34E-09	2.85E-09	5.10E-09	1.77E-09	4.68E-06
Cm-244	4.04E-07	5.53E-08	3.28E-08	3.72E-08	4.51E-08	8.09E-08	2.81E-08	7.43E-05
Cm-245	3.96E-11	5.43E-12	3.22E-12	3.65E-12	4.43E-12	7.94E-12	2.76E-12	7.29E-09
Cm-246	3.71E-13	5.08E-14	3.01E-14	3.41E-14	4.14E-14	7.43E-14	2.58E-14	6.82E-11
Cm-247	8.34E-19	1.14E-19	6.78E-20	7.68E-20	9.33E-20	1.67E-19	5.81E-20	1.53E-16
Cm-248	3.10E-19	4.25E-20	2.52E-20	2.86E-20	3.47E-20	6.21E-20	2.16E-20	5.70E-17
Totals =	6.66E+01	9.12E+00	5.42E+00	6.14E+00	7.45E+00	1.33E+01	4.64E+00	1.23E+04

File = "NEW General Plant Waste.xls"

Table B-26. Upper-bound inventory for the general plant waste stream ANL-MOD-5H (1960 through 1983).

BE Cs-137 Ci =	0.38	17.50	68.13	0.75	86.88	96.63	1099.41	2752.14	
Maximum Scaling Factor									
Nuclide	(Ci/Cs-137)	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)
H-3	2.46E-02	9.20E-03	4.29E-01	1.67E+00	1.84E-02	2.13E+00	2.37E+00	2.70E+01	6.75E+01
C-14	1.67E-05	6.26E-06	2.92E-04	1.14E-03	1.25E-05	1.45E-03	1.61E-03	1.84E-02	4.60E-02
C-136	4.12E-07	1.55E-07	7.22E-06	2.81E-05	3.09E-07	3.58E-05	3.99E-05	4.53E-04	1.14E-03
Co-60	1.91E-01	7.18E-02	3.35E+00	1.30E+01	1.44E-01	1.66E+01	1.85E+01	2.11E+02	5.27E+02
Ni-59	1.00E-04	3.76E-05	1.75E-03	6.82E-03	7.51E-05	8.70E-03	9.68E-03	1.10E-01	2.76E-01
Ni-63	7.73E-04	2.90E-04	1.35E-02	5.26E-02	5.80E-04	6.71E-02	7.47E-02	8.50E-01	2.13E+00
Sr-90	1.45E+00	5.42E-01	2.53E+01	9.85E+01	1.08E+00	1.26E+02	1.40E+02	1.59E+03	3.98E+03
Nb-94	1.65E-06	6.20E-07	2.90E-05	1.13E-04	1.24E-06	1.44E-04	1.60E-04	1.82E-03	4.55E-03
Tc-99	2.45E-04	9.17E-05	4.28E-03	1.67E-02	1.83E-04	2.12E-02	2.36E-02	2.69E-01	6.73E-01
I-129	5.05E-07	1.89E-07	8.83E-06	3.44E-05	3.79E-07	4.38E-05	4.88E-05	5.55E-04	1.39E-03
Cs-137	2.00E+00	7.50E-01	3.50E+01	1.36E+02	1.50E+00	1.74E+02	1.93E+02	2.20E+03	5.50E+03
Eu-152	2.54E-04	9.52E-05	4.44E-03	1.73E-02	1.90E-04	2.21E-02	2.45E-02	2.79E-01	6.99E-01
Eu-154	2.65E-02	9.94E-03	4.64E-01	1.81E+00	1.99E-02	2.30E+00	2.56E+00	2.91E+01	7.29E+01
Pb-210	1.15E-11	4.32E-12	2.02E-10	7.85E-10	8.64E-12	1.00E-09	1.11E-09	1.27E-08	3.17E-08
Ra-226	2.15E-10	8.06E-11	3.76E-09	1.46E-08	1.61E-10	1.87E-08	2.08E-08	2.36E-07	5.91E-07
Ra-228	1.21E-13	4.54E-14	2.12E-12	8.24E-12	9.08E-14	1.05E-11	1.17E-11	1.33E-10	3.33E-10
Ac-227	7.10E-09	2.66E-09	1.24E-07	4.84E-07	5.32E-09	6.17E-07	6.86E-07	7.80E-06	1.95E-05
Th-228	5.22E-06	1.96E-06	9.13E-05	3.55E-04	3.91E-06	4.53E-04	5.04E-04	5.74E-03	1.44E-02
Th-229	3.76E-11	1.41E-11	6.57E-10	2.56E-09	2.82E-11	3.26E-09	3.63E-09	4.13E-08	1.03E-07
Th-230	9.87E-09	3.70E-09	1.73E-07	6.72E-07	7.40E-09	8.57E-07	9.53E-07	1.08E-05	2.72E-05
Th-232	1.30E-07	4.86E-08	2.27E-06	8.84E-06	9.73E-08	1.13E-05	1.25E-05	1.43E-04	3.57E-04
Pa-231	8.33E-09	3.12E-09	1.46E-07	5.68E-07	6.25E-09	7.24E-07	8.05E-07	9.16E-06	2.29E-05
U-232	2.28E-07	8.56E-08	3.99E-06	1.55E-05	1.71E-07	1.98E-05	2.21E-05	2.51E-04	6.28E-04
U-233	1.85E-08	6.94E-09	3.24E-07	1.26E-06	1.39E-08	1.61E-06	1.79E-06	2.03E-05	5.09E-05
U-234	1.21E-04	4.53E-05	2.11E-03	8.22E-03	9.05E-05	1.05E-02	1.17E-02	1.33E-01	3.32E-01
U-235	2.71E-06	1.02E-06	4.74E-05	1.85E-04	2.03E-06	2.35E-04	2.62E-04	2.98E-03	7.45E-03
U-236	7.77E-06	2.92E-06	1.36E-04	5.30E-04	5.83E-06	6.75E-04	7.51E-04	8.55E-03	2.14E-02
U-238	9.46E-07	3.55E-07	1.65E-05	6.44E-05	7.09E-07	8.21E-05	9.14E-05	1.04E-03	2.60E-03
Np-237	1.61E-06	6.03E-07	2.82E-05	1.10E-04	1.21E-06	1.40E-04	1.55E-04	1.77E-03	4.43E-03
Pu-238	1.25E-03	4.67E-04	2.18E-02	8.49E-02	9.34E-04	1.08E-01	1.20E-01	1.37E+00	3.43E+00
Pu-239	3.31E-02	1.24E-02	5.80E-01	2.26E+00	2.48E-02	2.88E+00	3.20E+00	3.64E+01	9.12E+01
Pu-240	2.54E-03	9.51E-04	4.44E-02	1.73E-01	1.90E-03	2.20E-01	2.45E-01	2.79E+00	6.98E+00
Pu-241	2.18E-01	8.18E-02	3.82E+00	1.49E+01	1.64E-01	1.89E+01	2.11E+01	2.40E+02	6.00E+02
Pu-242	6.97E-07	2.62E-07	1.22E-05	4.75E-05	5.23E-07	6.06E-05	6.74E-05	7.67E-04	1.92E-03
Pu-244	4.61E-16	1.73E-16	8.07E-15	3.14E-14	3.46E-16	4.01E-14	4.46E-14	5.07E-13	1.27E-12
Am-241	1.09E-03	4.10E-04	1.91E-02	7.44E-02	8.19E-04	9.49E-02	1.06E-01	1.20E+00	3.01E+00
Am-243	2.95E-06	1.11E-06	5.17E-05	2.01E-04	2.22E-06	2.57E-04	2.85E-04	3.25E-03	8.13E-03
Cm-243	8.41E-07	3.15E-07	1.47E-05	5.73E-05	6.31E-07	7.31E-05	8.13E-05	9.25E-04	2.31E-03
Cm-244	5.34E-05	2.00E-05	9.34E-04	3.64E-03	4.00E-05	4.64E-03	5.16E-03	5.87E-02	1.47E-01
Cm-245	1.31E-09	4.91E-10	2.29E-08	8.92E-08	9.82E-10	1.14E-07	1.27E-07	1.44E-06	3.60E-06
Cm-246	1.22E-11	4.59E-12	2.14E-10	8.34E-10	9.18E-12	1.06E-09	1.18E-09	1.35E-08	3.37E-08
Cm-247	4.41E-18	1.65E-18	7.72E-17	3.00E-16	3.31E-18	3.83E-16	4.26E-16	4.85E-15	1.21E-14
Cm-248	4.10E-19	1.54E-19	7.17E-18	2.79E-17	3.07E-19	3.56E-17	3.96E-17	4.50E-16	1.13E-15
Totals =		1.48E+00	6.93E+01	2.70E+02	2.97E+00	3.44E+02	3.83E+02	4.35E+03	1.09E+04

Table B-26 (Part 2). Upper-bound inventory for waste stream ANL-MOD-5H (1960 through 1983).

Cs-137 Ci =	5132.18	1916.23	413.10	1235.27	10.95	669.27	124.81	42.97	124.68
Nuclide	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)	1976 (Ci)
H-3	1.26E+02	4.70E+01	1.01E+01	3.03E+01	2.69E-01	1.64E+01	3.06E+00	1.05E+00	3.06E+00
C-14	8.57E-02	3.20E-02	6.90E-03	2.06E-02	1.83E-04	1.12E-02	2.09E-03	7.18E-04	2.08E-03
Cl-36	2.12E-03	7.90E-04	1.70E-04	5.10E-04	4.52E-06	2.76E-04	5.15E-05	1.77E-05	5.14E-05
Co-60	9.83E+02	3.67E+02	7.91E+01	2.37E+02	2.10E+00	1.28E+02	2.39E+01	8.23E+00	2.39E+01
Ni-59	5.14E-01	1.92E-01	4.14E-02	1.24E-01	1.10E-03	6.70E-02	1.25E-02	4.30E-03	1.25E-02
Ni-63	3.97E+00	1.48E+00	3.19E-01	9.55E-01	8.46E-03	5.17E-01	9.65E-02	3.32E-02	9.64E-02
Sr-90	7.42E+03	2.77E+03	5.97E+02	1.79E+03	1.58E+01	9.68E+02	1.80E+02	6.21E+01	1.80E+02
Nb-94	8.49E-03	3.17E-03	6.83E-04	2.04E-03	1.81E-05	1.11E-03	2.06E-04	7.11E-05	2.06E-04
Tc-99	1.25E+00	4.69E-01	1.01E-01	3.02E-01	2.68E-03	1.64E-01	3.05E-02	1.05E-02	3.05E-02
I-129	2.59E-03	9.67E-04	2.08E-04	6.23E-04	5.53E-06	3.38E-04	6.30E-05	2.17E-05	6.29E-05
Cs-137	1.03E+04	3.83E+03	8.26E+02	2.47E+03	2.19E+01	1.34E+03	2.50E+02	8.59E+01	2.49E+02
Eu-152	1.30E+00	4.87E-01	1.05E-01	3.14E-01	2.78E-03	1.70E-01	3.17E-02	1.09E-02	3.17E-02
Eu-154	1.36E+02	5.08E+01	1.09E+01	3.27E+01	2.90E-01	1.77E+01	3.31E+00	1.14E+00	3.30E+00
Pb-210	5.91E-08	2.21E-08	4.76E-09	1.42E-08	1.26E-10	7.71E-09	1.44E-09	4.95E-10	1.44E-09
Ra-226	1.10E-06	4.12E-07	8.88E-08	2.65E-07	2.35E-09	1.44E-07	2.68E-08	9.23E-09	2.68E-08
Ra-228	6.21E-10	2.32E-10	5.00E-11	1.49E-10	1.32E-12	8.10E-11	1.51E-11	5.20E-12	1.51E-11
Ac-227	3.64E-05	1.36E-05	2.93E-06	8.77E-06	7.77E-08	4.75E-06	8.86E-07	3.05E-07	8.85E-07
Th-228	2.68E-02	1.00E-02	2.16E-03	6.45E-03	5.71E-05	3.49E-03	6.51E-04	2.24E-04	6.51E-04
Th-229	1.93E-07	7.20E-08	1.55E-08	4.64E-08	4.11E-10	2.51E-08	4.69E-09	1.61E-09	4.68E-09
Th-230	5.06E-05	1.89E-05	4.08E-06	1.22E-05	1.08E-07	6.60E-06	1.23E-06	4.24E-07	1.23E-06
Th-232	6.66E-04	2.49E-04	5.36E-05	1.60E-04	1.42E-06	8.68E-05	1.62E-05	5.57E-06	1.62E-05
Pa-231	4.28E-05	1.60E-05	3.44E-06	1.03E-05	9.12E-08	5.58E-06	1.04E-06	3.58E-07	1.04E-06
U-232	1.17E-03	4.37E-04	9.43E-05	2.82E-04	2.50E-06	1.53E-04	2.85E-05	9.81E-06	2.85E-05
U-233	9.50E-05	3.55E-05	7.64E-06	2.29E-05	2.03E-07	1.24E-05	2.31E-06	7.95E-07	2.31E-06
U-234	6.20E-01	2.31E-01	4.99E-02	1.49E-01	1.32E-03	8.08E-02	1.51E-02	5.19E-03	1.51E-02
U-235	1.39E-02	5.19E-03	1.12E-03	3.35E-03	2.97E-05	1.81E-03	3.38E-04	1.16E-04	3.38E-04
U-236	3.99E-02	1.49E-02	3.21E-03	9.60E-03	8.51E-05	5.20E-03	9.70E-04	3.34E-04	9.69E-04
U-238	4.85E-03	1.81E-03	3.91E-04	1.17E-03	1.04E-05	6.33E-04	1.18E-04	4.06E-05	1.18E-04
Np-237	8.26E-03	3.08E-03	6.65E-04	1.99E-03	1.76E-05	1.08E-03	2.01E-04	6.91E-05	2.01E-04
Pu-238	6.39E+00	2.39E+00	5.15E-01	1.54E+00	1.36E-02	8.34E-01	1.55E-01	5.35E-02	1.55E-01
Pu-239	1.70E+02	6.35E+01	1.37E+01	4.09E+01	3.63E-01	2.22E+01	4.14E+00	1.42E+00	4.13E+00
Pu-240	1.30E+01	4.86E+00	1.05E+00	3.13E+00	2.78E-02	1.70E+00	3.16E-01	1.09E-01	3.16E-01
Pu-241	1.12E+03	4.18E+02	9.01E+01	2.69E+02	2.39E+00	1.46E+02	2.72E+01	9.37E+00	2.72E+01
Pu-242	3.58E-03	1.34E-03	2.88E-04	8.62E-04	7.64E-06	4.67E-04	8.71E-05	3.00E-05	8.70E-05
Pu-244	2.37E-12	8.84E-13	1.91E-13	5.70E-13	5.05E-15	3.09E-13	5.76E-14	1.98E-14	5.75E-14
Am-241	5.61E+00	2.09E+00	4.51E-01	1.35E+00	1.20E-02	7.31E-01	1.36E-01	4.69E-02	1.36E-01
Am-243	1.52E-02	5.66E-03	1.22E-03	3.65E-03	3.23E-05	1.98E-03	3.69E-04	1.27E-04	3.68E-04
Cm-243	4.32E-03	1.61E-03	3.47E-04	1.04E-03	9.21E-06	5.63E-04	1.05E-04	3.61E-05	1.05E-04
Cm-244	2.74E-01	1.02E-01	2.20E-02	6.59E-02	5.84E-04	3.57E-02	6.66E-03	2.29E-03	6.65E-03
Cm-245	6.72E-06	2.51E-06	5.41E-07	1.62E-06	1.43E-08	8.77E-07	1.63E-07	5.63E-08	1.63E-07
Cm-246	6.28E-08	2.35E-08	5.06E-09	1.51E-08	1.34E-10	8.20E-09	1.53E-09	5.26E-10	1.53E-09
Cm-247	2.26E-14	8.45E-15	1.82E-15	5.45E-15	4.83E-17	2.95E-15	5.50E-16	1.89E-16	5.50E-16
Cm-248	2.10E-15	7.85E-16	1.69E-16	5.06E-16	4.49E-18	2.74E-16	5.11E-17	1.76E-17	5.11E-17
Totals =	2.03E+04	7.59E+03	1.64E+03	4.89E+03	4.33E+01	2.65E+03	4.94E+02	1.70E+02	4.94E+02

Table B-26 (Part 3). Upper-bound inventory for waste stream ANL-MOD-5H (1960 through 1983).

Cs-137 Ci =	75.67	10.36	6.15	6.97	8.46	15.16	5.27	Total
Nuclide	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)	1960–1983 (Ci)
H-3	1.86E+00	2.54E-01	1.51E-01	1.71E-01	2.07E-01	3.72E-01	1.29E-01	3.41E+02
C-14	1.26E-03	1.73E-04	1.03E-04	1.16E-04	1.41E-04	2.53E-04	8.81E-05	2.33E-01
Cl-36	3.12E-05	4.27E-06	2.54E-06	2.87E-06	3.49E-06	6.25E-06	2.17E-06	5.74E-03
Co-60	1.45E+01	1.99E+00	1.18E+00	1.33E+00	1.62E+00	2.90E+00	1.01E+00	2.67E+03
Ni-59	7.58E-03	1.04E-03	6.16E-04	6.98E-04	8.47E-04	1.52E-03	5.28E-04	1.39E+00
Ni-63	5.85E-02	8.01E-03	4.75E-03	5.39E-03	6.54E-03	1.17E-02	4.07E-03	1.08E+01
Sr-90	1.09E+02	1.50E+01	8.89E+00	1.01E+01	1.22E+01	2.19E+01	7.62E+00	2.01E+04
Nb-94	1.25E-04	1.71E-05	1.02E-05	1.15E-05	1.40E-05	2.51E-05	8.72E-06	2.30E-02
Tc-99	1.85E-02	2.53E-03	1.50E-03	1.70E-03	2.07E-03	3.71E-03	1.29E-03	3.40E+00
I-129	3.82E-05	5.23E-06	3.10E-06	3.52E-06	4.27E-06	7.65E-06	2.66E-06	7.02E-03
Cs-137	1.51E+02	2.07E+01	1.23E+01	1.39E+01	1.69E+01	3.03E+01	1.05E+01	2.78E+04
Eu-152	1.92E-02	2.63E-03	1.56E-03	1.77E-03	2.15E-03	3.85E-03	1.34E-03	3.54E+00
Eu-154	2.01E+00	2.75E-01	1.63E-01	1.85E-01	2.24E-01	4.02E-01	1.40E-01	3.69E+02
Pb-210	8.71E-10	1.19E-10	7.08E-11	8.03E-11	9.74E-11	1.75E-10	6.07E-11	1.60E-07
Ra-226	1.63E-08	2.23E-09	1.32E-09	1.50E-09	1.82E-09	3.26E-09	1.13E-09	2.99E-06
Ra-228	9.16E-12	1.25E-12	7.44E-13	8.43E-13	1.02E-12	1.83E-12	6.38E-13	1.68E-09
Ac-227	5.37E-07	7.35E-08	4.37E-08	4.95E-08	6.00E-08	1.08E-07	3.74E-08	9.88E-05
Th-228	3.95E-04	5.41E-05	3.21E-05	3.64E-05	4.41E-05	7.91E-05	2.75E-05	7.26E-02
Th-229	2.84E-09	3.89E-10	2.31E-10	2.62E-10	3.18E-10	5.69E-10	1.98E-10	5.23E-07
Th-230	7.47E-07	1.02E-07	6.07E-08	6.88E-08	8.35E-08	1.50E-07	5.20E-08	1.37E-04
Th-232	9.82E-06	1.34E-06	7.98E-07	9.04E-07	1.10E-06	1.97E-06	6.84E-07	1.81E-03
Pa-231	6.30E-07	8.63E-08	5.12E-08	5.81E-08	7.05E-08	1.26E-07	4.39E-08	1.16E-04
U-232	1.73E-05	2.37E-06	1.40E-06	1.59E-06	1.93E-06	3.46E-06	1.20E-06	3.18E-03
U-233	1.40E-06	1.92E-07	1.14E-07	1.29E-07	1.57E-07	2.80E-07	9.76E-08	2.58E-04
U-234	9.13E-03	1.25E-03	7.42E-04	8.41E-04	1.02E-03	1.83E-03	6.36E-04	1.68E+00
U-235	2.05E-04	2.81E-05	1.67E-05	1.89E-05	2.29E-05	4.11E-05	1.43E-05	3.77E-02
U-236	5.88E-04	8.06E-05	4.78E-05	5.42E-05	6.58E-05	1.18E-04	4.10E-05	1.08E-01
U-238	7.16E-05	9.80E-06	5.82E-06	6.59E-06	8.00E-06	1.43E-05	4.99E-06	1.32E-02
Np-237	1.22E-04	1.67E-05	9.90E-06	1.12E-05	1.36E-05	2.44E-05	8.48E-06	2.24E-02
Pu-238	9.43E-02	1.29E-02	7.66E-03	8.68E-03	1.05E-02	1.89E-02	6.57E-03	1.73E+01
Pu-239	2.51E+00	3.43E-01	2.04E-01	2.31E-01	2.80E-01	5.02E-01	1.75E-01	4.61E+02
Pu-240	1.92E-01	2.63E-02	1.56E-02	1.77E-02	2.14E-02	3.84E-02	1.34E-02	3.53E+01
Pu-241	1.65E+01	2.26E+00	1.34E+00	1.52E+00	1.84E+00	3.31E+00	1.15E+00	3.04E+03
Pu-242	5.28E-05	7.23E-06	4.29E-06	4.86E-06	5.90E-06	1.06E-05	3.68E-06	9.71E-03
Pu-244	3.49E-14	4.78E-15	2.84E-15	3.21E-15	3.90E-15	6.99E-15	2.43E-15	6.42E-12
Am-241	8.27E-02	1.13E-02	6.72E-03	7.61E-03	9.24E-03	1.66E-02	5.76E-03	1.52E+01
Am-243	2.23E-04	3.06E-05	1.82E-05	2.06E-05	2.50E-05	4.48E-05	1.56E-05	4.11E-02
Cm-243	6.36E-05	8.72E-06	5.17E-06	5.86E-06	7.11E-06	1.27E-05	4.43E-06	1.17E-02
Cm-244	4.04E-03	5.53E-04	3.28E-04	3.72E-04	4.51E-04	8.09E-04	2.81E-04	7.43E-01
Cm-245	9.91E-08	1.36E-08	8.06E-09	9.13E-09	1.11E-08	1.99E-08	6.91E-09	1.82E-05
Cm-246	9.27E-10	1.27E-10	7.53E-11	8.53E-11	1.04E-10	1.86E-10	6.46E-11	1.70E-07
Cm-247	3.34E-16	4.57E-17	2.71E-17	3.07E-17	3.73E-17	6.68E-17	2.33E-17	6.14E-14
Cm-248	3.10E-17	4.25E-18	2.52E-18	2.86E-18	3.47E-18	6.21E-18	2.16E-18	5.70E-15
Totals =	3.00E+02	4.10E+01	2.44E+01	2.76E+01	3.35E+01	6.00E+01	2.09E+01	5.51E+04

File = "NEW General Plant Waste.xls"

Table B-27. Best-estimate inventory for the general plant waste stream ANL-MOD-4R (1984 through 1993).

BE Cs-137 Ci =	3.27	33.14	8.55	14.84	19.20	15.93	1.28	
Best-estimate Scaling Factor	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	
Nuclide	(Ci/Cs-137)							
H-3	4.92E-03	1.60E-02	1.63E-01	4.19E-02	7.28E-02	9.42E-02	7.81E-02	6.26E-03
C-14	3.34E-06	1.09E-05	1.11E-04	2.86E-05	4.96E-05	6.42E-05	5.32E-05	4.27E-06
Cl-36	4.12E-09	1.35E-08	1.37E-07	3.53E-08	6.12E-08	7.92E-08	6.57E-08	5.27E-09
Co-60	1.91E-02	6.26E-02	6.35E-01	1.64E-01	2.84E-01	3.68E-01	3.05E-01	2.45E-02
Ni-59	1.00E-05	3.27E-05	3.32E-04	8.57E-05	1.49E-04	1.92E-04	1.60E-04	1.28E-05
Ni-63	3.86E-04	1.26E-03	1.28E-02	3.30E-03	5.73E-03	7.42E-03	6.15E-03	4.93E-04
Sr-90	7.23E-01	2.36E+00	2.40E+01	6.18E+00	1.07E+01	1.39E+01	1.15E+01	9.23E-01
Nb-94	5.51E-07	1.80E-06	1.83E-05	4.72E-06	8.18E-06	1.06E-05	8.78E-06	7.04E-07
Tc-99	1.22E-04	3.99E-04	4.05E-03	1.05E-03	1.81E-03	2.35E-03	1.95E-03	1.56E-04
I-129	2.52E-07	8.24E-07	8.36E-06	2.16E-06	3.74E-06	4.85E-06	4.02E-06	3.22E-07
Cs-137	1.00E+00	3.27E+00	3.31E+01	8.55E+00	1.48E+01	1.92E+01	1.59E+01	1.28E+00
Eu-152	5.08E-05	1.66E-04	1.68E-03	4.34E-04	7.54E-04	9.75E-04	8.09E-04	6.49E-05
Eu-154	5.30E-03	1.73E-02	1.76E-01	4.53E-02	7.86E-02	1.02E-01	8.44E-02	6.77E-03
Pb-210	1.15E-12	3.76E-12	3.82E-11	9.85E-12	1.71E-11	2.21E-11	1.83E-11	1.47E-12
Ra-226	1.07E-11	3.51E-11	3.56E-10	9.19E-11	1.59E-10	2.06E-10	1.71E-10	1.37E-11
Ra-228	1.21E-15	3.95E-15	4.01E-14	1.03E-14	1.80E-14	2.32E-14	1.93E-14	1.54E-15
Ac-227	3.55E-10	1.16E-09	1.18E-08	3.03E-09	5.27E-09	6.81E-09	5.65E-09	4.53E-10
Th-228	1.04E-07	3.41E-07	3.46E-06	8.92E-07	1.55E-06	2.00E-06	1.66E-06	1.33E-07
Th-229	1.25E-11	4.09E-11	4.15E-10	1.07E-10	1.86E-10	2.40E-10	1.99E-10	1.60E-11
Th-230	4.93E-09	1.61E-08	1.63E-07	4.22E-08	7.32E-08	9.47E-08	7.86E-08	6.30E-09
Th-232	2.60E-08	8.47E-08	8.60E-07	2.22E-07	3.85E-07	4.98E-07	4.13E-07	3.31E-08
Pa-231	1.67E-09	5.44E-09	5.52E-08	1.42E-08	2.47E-08	3.20E-08	2.65E-08	2.13E-09
U-232	1.14E-07	3.73E-07	3.78E-06	9.76E-07	1.69E-06	2.19E-06	1.82E-06	1.46E-07
U-233	9.25E-09	3.02E-08	3.07E-07	7.91E-08	1.37E-07	1.78E-07	1.47E-07	1.18E-08
U-234	6.04E-05	1.97E-04	2.00E-03	5.16E-04	8.96E-04	1.16E-03	9.61E-04	7.71E-05
U-235	2.46E-06	8.04E-06	8.16E-05	2.11E-05	3.65E-05	4.73E-05	3.92E-05	3.14E-06
U-236	3.89E-06	1.27E-05	1.29E-04	3.32E-05	5.77E-05	7.46E-05	6.19E-05	4.96E-06
U-238	4.73E-07	1.54E-06	1.57E-05	4.04E-06	7.02E-06	9.08E-06	7.53E-06	6.04E-07
Np-237	8.04E-07	2.63E-06	2.67E-05	6.88E-06	1.19E-05	1.54E-05	1.28E-05	1.03E-06
Pu-238	4.15E-04	1.36E-03	1.38E-02	3.55E-03	6.16E-03	7.97E-03	6.61E-03	5.30E-04
Pu-239	1.66E-02	5.41E-02	5.49E-01	1.42E-01	2.46E-01	3.18E-01	2.64E-01	2.11E-02
Pu-240	2.54E-04	8.28E-04	8.40E-03	2.17E-03	3.76E-03	4.87E-03	4.04E-03	3.24E-04
Pu-241	4.36E-03	1.42E-02	1.45E-01	3.73E-02	6.47E-02	8.38E-02	6.95E-02	5.57E-03
Pu-242	6.97E-08	2.28E-07	2.31E-06	5.96E-07	1.03E-06	1.34E-06	1.11E-06	8.90E-08
Pu-244	4.61E-17	1.51E-16	1.53E-15	3.94E-16	6.84E-16	8.85E-16	7.35E-16	5.89E-17
Am-241	1.09E-04	3.57E-04	3.62E-03	9.34E-04	1.62E-03	2.10E-03	1.74E-03	1.39E-04
Am-243	5.91E-08	1.93E-07	1.96E-06	5.05E-07	8.77E-07	1.13E-06	9.41E-07	7.54E-08
Cm-243	1.68E-08	5.49E-08	5.57E-07	1.44E-07	2.50E-07	3.23E-07	2.68E-07	2.15E-08
Cm-244	5.34E-07	1.74E-06	1.77E-05	4.56E-06	7.92E-06	1.02E-05	8.50E-06	6.81E-07
Cm-245	2.62E-11	8.56E-11	8.68E-10	2.24E-10	3.89E-10	5.03E-10	4.17E-10	3.34E-11
Cm-246	2.45E-13	8.00E-13	8.12E-12	2.09E-12	3.63E-12	4.70E-12	3.90E-12	3.13E-13
Cm-247	2.21E-19	7.20E-19	7.31E-18	1.89E-18	3.27E-18	4.23E-18	3.51E-18	2.82E-19
Cm-248	4.10E-20	1.34E-19	1.36E-18	3.50E-19	6.08E-19	7.87E-19	6.53E-19	5.23E-20
Totals =		5.87E+00	5.95E+01	1.54E+01	2.67E+01	3.45E+01	2.86E+01	2.29E+00

Table B-27 (Part 2). Best-estimate inventory for waste stream ANL-MOD-4R (1984 through 1993).

Cs-137 Ci =	0.57	3.56	0.62	Total
Nuclide	1991 (Ci)	1992 (Ci)	1993 (Ci)	1984–1993 (Ci)
H-3	2.82E-03	1.75E-02	3.05E-03	4.95E-01
C-14	1.92E-06	1.19E-05	2.08E-06	3.37E-04
Cl-36	2.37E-09	1.47E-08	2.56E-09	4.16E-07
Co-60	1.10E-02	6.81E-02	1.19E-02	1.93E+00
Ni-59	5.76E-06	3.56E-05	6.23E-06	1.01E-03
Ni-63	2.22E-04	1.37E-03	2.40E-04	3.90E-02
Sr-90	4.16E-01	2.57E+00	4.49E-01	7.30E+01
Nb-94	3.17E-07	1.96E-06	3.43E-07	5.57E-05
Tc-99	7.03E-05	4.35E-04	7.60E-05	1.23E-02
I-129	1.45E-07	8.98E-07	1.57E-07	2.55E-05
Cs-137	5.75E-01	3.56E+00	6.22E-01	1.01E+02
Eu-152	2.92E-05	1.81E-04	3.16E-05	5.13E-03
Eu-154	3.05E-03	1.89E-02	3.30E-03	5.35E-01
Pb-210	6.62E-13	4.10E-12	7.16E-13	1.16E-10
Ra-226	6.18E-12	3.82E-11	6.68E-12	1.08E-09
Ra-228	6.96E-16	4.30E-15	7.52E-16	1.22E-13
Ac-227	2.04E-10	1.26E-09	2.21E-10	3.58E-08
Th-228	6.00E-08	3.71E-07	6.49E-08	1.05E-05
Th-229	7.20E-12	4.45E-11	7.78E-12	1.26E-09
Th-230	2.84E-09	1.75E-08	3.07E-09	4.98E-07
Th-232	1.49E-08	9.23E-08	1.61E-08	2.62E-06
Pa-231	9.58E-10	5.93E-09	1.04E-09	1.68E-07
U-232	6.56E-08	4.06E-07	7.10E-08	1.15E-05
U-233	5.32E-09	3.29E-08	5.75E-09	9.34E-07
U-234	3.47E-05	2.15E-04	3.75E-05	6.09E-03
U-235	1.42E-06	8.76E-06	1.53E-06	2.49E-04
U-236	2.23E-06	1.38E-05	2.42E-06	3.92E-04
U-238	2.72E-07	1.68E-06	2.94E-07	4.77E-05
Np-237	4.62E-07	2.86E-06	5.00E-07	8.12E-05
Pu-238	2.39E-04	1.48E-03	2.58E-04	4.19E-02
Pu-239	9.52E-03	5.89E-02	1.03E-02	1.67E+00
Pu-240	1.46E-04	9.02E-04	1.58E-04	2.56E-02
Pu-241	2.51E-03	1.55E-02	2.71E-03	4.40E-01
Pu-242	4.01E-08	2.48E-07	4.34E-08	7.04E-06
Pu-244	2.65E-17	1.64E-16	2.87E-17	4.66E-15
Am-241	6.28E-05	3.89E-04	6.79E-05	1.10E-02
Am-243	3.40E-08	2.10E-07	3.67E-08	5.96E-06
Cm-243	9.67E-09	5.98E-08	1.05E-08	1.70E-06
Cm-244	3.07E-07	1.90E-06	3.32E-07	5.39E-05
Cm-245	1.51E-11	9.32E-11	1.63E-11	2.64E-09
Cm-246	1.41E-13	8.71E-13	1.52E-13	2.47E-11
Cm-247	1.27E-19	7.84E-19	1.37E-19	2.23E-17
Cm-248	2.36E-20	1.46E-19	2.55E-20	4.14E-18
Totals =	1.03E+00	6.39E+00	1.12E+00	1.81E+02

File = "NEW General Plant Waste.xls"

Table B-28. Lower-bound inventory for the general plant waste stream ANL-MOD-4R (1984 through 1993).

BE Cs-137 Ci =		3.27	33.14	8.55	14.84	19.20	15.93	1.28
Minimum Scaling Factor		1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)
Nuclide	(Ci/Ci-Cs-137)							
H-3	9.84E-04	3.20E-03	3.25E-02	8.39E-03	1.46E-02	1.88E-02	1.56E-02	1.25E-03
C-14	6.68E-07	2.18E-06	2.21E-05	5.71E-06	9.92E-06	1.28E-05	1.06E-05	8.53E-07
Cl-36	4.12E-11	1.35E-10	1.37E-09	3.53E-10	6.12E-10	7.92E-10	6.57E-10	5.27E-11
Co-60	1.91E-03	6.26E-03	6.35E-02	1.64E-02	2.84E-02	3.68E-02	3.05E-02	2.45E-03
Ni-59	1.00E-06	3.27E-06	3.32E-05	8.57E-06	1.49E-05	1.92E-05	1.60E-05	1.28E-06
Ni-63	1.93E-04	6.31E-04	6.40E-03	1.65E-03	2.87E-03	3.71E-03	3.08E-03	2.47E-04
Sr-90	3.61E-01	1.18E+00	1.20E+01	3.09E+00	5.36E+00	6.94E+00	5.76E+00	4.61E-01
Nb-94	1.84E-07	6.00E-07	6.09E-06	1.57E-06	2.73E-06	3.53E-06	2.93E-06	2.35E-07
Tc-99	6.11E-05	2.00E-04	2.03E-03	5.23E-04	9.07E-04	1.17E-03	9.74E-04	7.80E-05
I-129	1.26E-07	4.12E-07	4.18E-06	1.08E-06	1.87E-06	2.42E-06	2.01E-06	1.61E-07
Cs-137	5.00E-01	1.63E+00	1.66E+01	4.28E+00	7.42E+00	9.60E+00	7.96E+00	6.38E-01
Eu-152	1.02E-05	3.32E-05	3.37E-04	8.69E-05	1.51E-04	1.95E-04	1.62E-04	1.30E-05
Eu-154	1.06E-03	3.46E-03	3.51E-02	9.06E-03	1.57E-02	2.04E-02	1.69E-02	1.35E-03
Pb-210	1.15E-13	3.76E-13	3.82E-12	9.85E-13	1.71E-12	2.21E-12	1.83E-12	1.47E-13
Ra-226	5.37E-13	1.75E-12	1.78E-11	4.59E-12	7.97E-12	1.03E-11	8.56E-12	6.86E-13
Ra-228	1.21E-17	3.95E-17	4.01E-16	1.03E-16	1.80E-16	2.32E-16	1.93E-16	1.54E-17
Ac-227	1.77E-11	5.80E-11	5.88E-10	1.52E-10	2.63E-10	3.41E-10	2.83E-10	2.27E-11
Th-228	2.09E-09	6.82E-09	6.92E-08	1.78E-08	3.10E-08	4.01E-08	3.32E-08	2.66E-09
Th-229	4.17E-12	1.36E-11	1.38E-10	3.57E-11	6.19E-11	8.01E-11	6.65E-11	5.33E-12
Th-230	2.47E-09	8.06E-09	8.17E-08	2.11E-08	3.66E-08	4.74E-08	3.93E-08	3.15E-09
Th-232	5.19E-09	1.69E-08	1.72E-07	4.44E-08	7.70E-08	9.96E-08	8.26E-08	6.62E-09
Pa-231	3.33E-10	1.09E-09	1.10E-08	2.85E-09	4.94E-09	6.40E-09	5.31E-09	4.25E-10
U-232	5.71E-08	1.86E-07	1.89E-06	4.88E-07	8.47E-07	1.10E-06	9.09E-07	7.28E-08
U-233	4.63E-09	1.51E-08	1.53E-07	3.96E-08	6.86E-08	8.88E-08	7.37E-08	5.91E-09
U-234	3.02E-05	9.86E-05	1.00E-03	2.58E-04	4.48E-04	5.79E-04	4.81E-04	3.85E-05
U-235	2.24E-06	7.31E-06	7.42E-05	1.91E-05	3.32E-05	4.30E-05	3.57E-05	2.86E-06
U-236	1.94E-06	6.35E-06	6.44E-05	1.66E-05	2.88E-05	3.73E-05	3.10E-05	2.48E-06
U-238	2.36E-07	7.72E-07	7.83E-06	2.02E-06	3.51E-06	4.54E-06	3.77E-06	3.02E-07
Np-237	4.02E-07	1.31E-06	1.33E-05	3.44E-06	5.97E-06	7.72E-06	6.41E-06	5.14E-07
Pu-238	1.38E-04	4.52E-04	4.59E-03	1.18E-03	2.05E-03	2.66E-03	2.20E-03	1.77E-04
Pu-239	8.28E-03	2.71E-02	2.74E-01	7.08E-02	1.23E-01	1.59E-01	1.32E-01	1.06E-02
Pu-240	2.54E-05	8.28E-05	8.40E-04	2.17E-04	3.76E-04	4.87E-04	4.04E-04	3.24E-05
Pu-241	8.72E-05	2.85E-04	2.89E-03	7.46E-04	1.29E-03	1.68E-03	1.39E-03	1.11E-04
Pu-242	6.97E-09	2.28E-08	2.31E-07	5.96E-08	1.03E-07	1.34E-07	1.11E-07	8.90E-09
Pu-244	4.61E-18	1.51E-17	1.53E-16	3.94E-17	6.84E-17	8.85E-17	7.35E-17	5.89E-18
Am-241	1.09E-05	3.57E-05	3.62E-04	9.34E-05	1.62E-04	2.10E-04	1.74E-04	1.39E-05
Am-243	1.18E-09	3.86E-09	3.91E-08	1.01E-08	1.75E-08	2.27E-08	1.88E-08	1.51E-09
Cm-243	3.36E-10	1.10E-09	1.11E-08	2.88E-09	4.99E-09	6.46E-09	5.36E-09	4.30E-10
Cm-244	5.34E-09	1.74E-08	1.77E-07	4.56E-08	7.92E-08	1.02E-07	8.50E-08	6.81E-09
Cm-245	5.24E-13	1.71E-12	1.74E-11	4.48E-12	7.77E-12	1.01E-11	8.35E-12	6.69E-13
Cm-246	4.90E-15	1.60E-14	1.62E-13	4.19E-14	7.27E-14	9.41E-14	7.80E-14	6.25E-15
Cm-247	1.10E-20	3.60E-20	3.65E-19	9.43E-20	1.64E-19	2.12E-19	1.76E-19	1.41E-20
Cm-248	4.10E-21	1.34E-20	1.36E-19	3.50E-20	6.08E-20	7.87E-20	6.53E-20	5.23E-21
Totals =		2.88E+00	2.92E+01	7.53E+00	1.31E+01	1.69E+01	1.40E+01	1.12E+00

Table B-28 (Part 2). Lower-bound inventory for waste stream ANL-MOD-4R (1984 through 1993).

Cs-137 Ci =	0.57	3.56	0.62	Total
Nuclide	1991 (Ci)	1992 (Ci)	1993 (Ci)	1984–1993 (Ci)
H-3	5.64E-04	3.49E-03	6.10E-04	9.90E-02
C-14	3.84E-07	2.38E-06	4.15E-07	6.75E-05
Cl-36	2.37E-11	1.47E-10	2.56E-11	4.16E-09
Co-60	1.10E-03	6.81E-03	1.19E-03	1.93E-01
Ni-59	5.76E-07	3.56E-06	6.23E-07	1.01E-04
Ni-63	1.11E-04	6.87E-04	1.20E-04	1.95E-02
Sr-90	2.08E-01	1.29E+00	2.25E-01	3.65E+01
Nb-94	1.06E-07	6.54E-07	1.14E-07	1.86E-05
Tc-99	3.51E-05	2.17E-04	3.80E-05	6.17E-03
I-129	7.25E-08	4.49E-07	7.84E-08	1.27E-05
Cs-137	2.87E-01	1.78E+00	3.11E-01	5.05E+01
Eu-152	5.84E-06	3.61E-05	6.32E-06	1.03E-03
Eu-154	6.09E-04	3.77E-03	6.59E-04	1.07E-01
Pb-210	6.62E-14	4.10E-13	7.16E-14	1.16E-11
Ra-226	3.09E-13	1.91E-12	3.34E-13	5.42E-11
Ra-228	6.96E-18	4.30E-17	7.52E-18	1.22E-15
Ac-227	1.02E-11	6.31E-11	1.10E-11	1.79E-09
Th-228	1.20E-09	7.42E-09	1.30E-09	2.11E-07
Th-229	2.40E-12	1.48E-11	2.59E-12	4.21E-10
Th-230	1.42E-09	8.77E-09	1.53E-09	2.49E-07
Th-232	2.98E-09	1.85E-08	3.23E-09	5.24E-07
Pa-231	1.92E-10	1.19E-09	2.07E-10	3.36E-08
U-232	3.28E-08	2.03E-07	3.55E-08	5.76E-06
U-233	2.66E-09	1.65E-08	2.88E-09	4.67E-07
U-234	1.73E-05	1.07E-04	1.88E-05	3.05E-03
U-235	1.29E-06	7.96E-06	1.39E-06	2.26E-04
U-236	1.12E-06	6.91E-06	1.21E-06	1.96E-04
U-238	1.36E-07	8.41E-07	1.47E-07	2.39E-05
Np-237	2.31E-07	1.43E-06	2.50E-07	4.06E-05
Pu-238	7.96E-05	4.92E-04	8.60E-05	1.40E-02
Pu-239	4.76E-03	2.95E-02	5.15E-03	8.36E-01
Pu-240	1.46E-05	9.02E-05	1.58E-05	2.56E-03
Pu-241	5.02E-05	3.10E-04	5.42E-05	8.81E-03
Pu-242	4.01E-09	2.48E-08	4.34E-09	7.04E-07
Pu-244	2.65E-18	1.64E-17	2.87E-18	4.66E-16
Am-241	6.28E-06	3.89E-05	6.79E-06	1.10E-03
Am-243	6.79E-10	4.20E-09	7.35E-10	1.19E-07
Cm-243	1.93E-10	1.20E-09	2.09E-10	3.40E-08
Cm-244	3.07E-09	1.90E-08	3.32E-09	5.39E-07
Cm-245	3.01E-13	1.86E-12	3.26E-13	5.29E-11
Cm-246	2.82E-15	1.74E-14	3.05E-15	4.94E-13
Cm-247	6.34E-21	3.92E-20	6.85E-21	1.11E-18
Cm-248	2.36E-21	1.46E-20	2.55E-21	4.14E-19
Totals =	5.06E-01	3.13E+00	5.47E-01	8.89E+01

File = "NEW General Plant Waste.xls"

Table B-29. Upper-bound inventory for the general plant waste stream ANL-MOD-4R (1984 through 1993).

BE Cs-137 Ci =		3.27	33.14	8.55	14.84	19.20	15.93	1.28
Maximum Scaling Factor		1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)
Nuclide	(Ci/Ci-Cs-137)							
H-3	2.46E-02	8.01E-02	8.13E-01	2.10E-01	3.64E-01	4.71E-01	3.91E-01	3.13E-02
C-14	1.67E-05	5.46E-05	5.54E-04	1.43E-04	2.48E-04	3.21E-04	2.66E-04	2.13E-05
Cl-36	4.12E-07	1.35E-06	1.37E-05	3.53E-06	6.12E-06	7.92E-06	6.57E-06	5.27E-07
Co-60	1.91E-01	6.26E-01	6.35E+00	1.64E+00	2.84E+00	3.68E+00	3.05E+00	2.45E-01
Ni-59	1.00E-04	3.27E-04	3.32E-03	8.57E-04	1.49E-03	1.92E-03	1.60E-03	1.28E-04
Ni-63	7.73E-04	2.52E-03	2.56E-02	6.61E-03	1.15E-02	1.48E-02	1.23E-02	9.87E-04
Sr-90	1.45E+00	4.72E+00	4.79E+01	1.24E+01	2.15E+01	2.78E+01	2.30E+01	1.85E+00
Nb-94	1.65E-06	5.40E-06	5.48E-05	1.41E-05	2.45E-05	3.18E-05	2.64E-05	2.11E-06
Tc-99	2.45E-04	7.99E-04	8.10E-03	2.09E-03	3.63E-03	4.69E-03	3.89E-03	3.12E-04
I-129	5.05E-07	1.65E-06	1.67E-05	4.32E-06	7.49E-06	9.69E-06	8.04E-06	6.44E-07
Cs-137	2.00E+00	6.53E+00	6.63E+01	1.71E+01	2.97E+01	3.84E+01	3.19E+01	2.55E+00
Eu-152	2.54E-04	8.30E-04	8.42E-03	2.17E-03	3.77E-03	4.88E-03	4.05E-03	3.24E-04
Eu-154	2.65E-02	8.66E-02	8.78E-01	2.27E-01	3.93E-01	5.09E-01	4.22E-01	3.38E-02
Pb-210	1.15E-11	3.76E-11	3.82E-10	9.85E-11	1.71E-10	2.21E-10	1.83E-10	1.47E-11
Ra-226	2.15E-10	7.02E-10	7.12E-09	1.84E-09	3.19E-09	4.13E-09	3.42E-09	2.74E-10
Ra-228	1.21E-13	3.95E-13	4.01E-12	1.03E-12	1.80E-12	2.32E-12	1.93E-12	1.54E-13
Ac-227	7.10E-09	2.32E-08	2.35E-07	6.07E-08	1.05E-07	1.36E-07	1.13E-07	9.06E-09
Th-228	5.22E-06	1.70E-05	1.73E-04	4.46E-05	7.74E-05	1.00E-04	8.31E-05	6.66E-06
Th-229	3.76E-11	1.23E-10	1.24E-09	3.21E-10	5.57E-10	7.21E-10	5.98E-10	4.79E-11
Th-230	9.87E-09	3.22E-08	3.27E-07	8.44E-08	1.46E-07	1.89E-07	1.57E-07	1.26E-08
Th-232	1.30E-07	4.24E-07	4.30E-06	1.11E-06	1.92E-06	2.49E-06	2.07E-06	1.66E-07
Pa-231	8.33E-09	2.72E-08	2.76E-07	7.12E-08	1.24E-07	1.60E-07	1.33E-07	1.06E-08
U-232	2.28E-07	7.45E-07	7.56E-06	1.95E-06	3.39E-06	4.38E-06	3.64E-06	2.91E-07
U-233	1.85E-08	6.04E-08	6.13E-07	1.58E-07	2.75E-07	3.55E-07	2.95E-07	2.36E-08
U-234	1.21E-04	3.94E-04	4.00E-03	1.03E-03	1.79E-03	2.32E-03	1.92E-03	1.54E-04
U-235	2.71E-06	8.85E-06	8.98E-05	2.32E-05	4.02E-05	5.20E-05	4.31E-05	3.46E-06
U-236	7.77E-06	2.54E-05	2.58E-04	6.65E-05	1.15E-04	1.49E-04	1.24E-04	9.93E-06
U-238	9.46E-07	3.09E-06	3.13E-05	8.09E-06	1.40E-05	1.82E-05	1.51E-05	1.21E-06
Np-237	1.61E-06	5.26E-06	5.33E-05	1.38E-05	2.39E-05	3.09E-05	2.56E-05	2.05E-06
Pu-238	1.25E-03	4.07E-03	4.13E-02	1.07E-02	1.85E-02	2.39E-02	1.98E-02	1.59E-03
Pu-239	3.31E-02	1.08E-01	1.10E+00	2.83E-01	4.92E-01	6.36E-01	5.28E-01	4.23E-02
Pu-240	2.54E-03	8.28E-03	8.40E-02	2.17E-02	3.76E-02	4.87E-02	4.04E-02	3.24E-03
Pu-241	2.18E-01	7.12E-01	7.23E+00	1.86E+00	3.24E+00	4.19E+00	3.47E+00	2.78E-01
Pu-242	6.97E-07	2.28E-06	2.31E-05	5.96E-06	1.03E-05	1.34E-05	1.11E-05	8.90E-07
Pu-244	4.61E-16	1.51E-15	1.53E-14	3.94E-15	6.84E-15	8.85E-15	7.35E-15	5.89E-16
Am-241	1.09E-03	3.57E-03	3.62E-02	9.34E-03	1.62E-02	2.10E-02	1.74E-02	1.39E-03
Am-243	2.95E-06	9.65E-06	9.79E-05	2.53E-05	4.38E-05	5.67E-05	4.70E-05	3.77E-06
Cm-243	8.41E-07	2.75E-06	2.79E-05	7.19E-06	1.25E-05	1.62E-05	1.34E-05	1.07E-06
Cm-244	5.34E-05	1.74E-04	1.77E-03	4.56E-04	7.92E-04	1.02E-03	8.50E-04	6.81E-05
Cm-245	1.31E-09	4.28E-09	4.34E-08	1.12E-08	1.94E-08	2.52E-08	2.09E-08	1.67E-09
Cm-246	1.22E-11	4.00E-11	4.06E-10	1.05E-10	1.82E-10	2.35E-10	1.95E-10	1.56E-11
Cm-247	4.41E-18	1.44E-17	1.46E-16	3.77E-17	6.54E-17	8.47E-17	7.02E-17	5.63E-18
Cm-248	4.10E-19	1.34E-18	1.36E-17	3.50E-18	6.08E-18	7.87E-18	6.53E-18	5.23E-19
Totals =		1.29E+01	1.31E+02	3.39E+01	5.87E+01	7.60E+01	6.31E+01	5.05E+00

Table B-29 (Part 2). Upper-bound inventory for waste stream ANL-MOD-4R (1984 through 1993).

Cs-137 Ci =	0.57	3.56	0.62	Total
Nuclide	1991 (Ci)	1992 (Ci)	1993 (Ci)	1984–1993 (Ci)
H-3	1.41E-02	8.73E-02	1.53E-02	2.48E+00
C-14	9.60E-06	5.94E-05	1.04E-05	1.69E-03
Cl-36	2.37E-07	1.47E-06	2.56E-07	4.16E-05
Co-60	1.10E-01	6.81E-01	1.19E-01	1.93E+01
Ni-59	5.76E-05	3.56E-04	6.23E-05	1.01E-02
Ni-63	4.44E-04	2.75E-03	4.80E-04	7.80E-02
Sr-90	8.31E-01	5.14E+00	8.99E-01	1.46E+02
Nb-94	9.51E-07	5.88E-06	1.03E-06	1.67E-04
Tc-99	1.41E-04	8.70E-04	1.52E-04	2.47E-02
I-129	2.90E-07	1.80E-06	3.14E-07	5.09E-05
Cs-137	1.15E+00	7.11E+00	1.24E+00	2.02E+02
Eu-152	1.46E-04	9.03E-04	1.58E-04	2.56E-02
Eu-154	1.52E-02	9.43E-02	1.65E-02	2.68E+00
Pb-210	6.62E-12	4.10E-11	7.16E-12	1.16E-09
Ra-226	1.24E-10	7.64E-10	1.34E-10	2.17E-08
Ra-228	6.96E-14	4.30E-13	7.52E-14	1.22E-11
Ac-227	4.08E-09	2.52E-08	4.41E-09	7.16E-07
Th-228	3.00E-06	1.86E-05	3.24E-06	5.27E-04
Th-229	2.16E-11	1.34E-10	2.33E-11	3.79E-09
Th-230	5.67E-09	3.51E-08	6.13E-09	9.96E-07
Th-232	7.46E-08	4.61E-07	8.06E-08	1.31E-05
Pa-231	4.79E-09	2.96E-08	5.18E-09	8.41E-07
U-232	1.31E-07	8.12E-07	1.42E-07	2.30E-05
U-233	1.06E-08	6.58E-08	1.15E-08	1.87E-06
U-234	6.94E-05	4.29E-04	7.51E-05	1.22E-02
U-235	1.56E-06	9.63E-06	1.68E-06	2.73E-04
U-236	4.47E-06	2.77E-05	4.83E-06	7.85E-04
U-238	5.44E-07	3.36E-06	5.88E-07	9.55E-05
Np-237	9.25E-07	5.72E-06	1.00E-06	1.62E-04
Pu-238	7.16E-04	4.43E-03	7.74E-04	1.26E-01
Pu-239	1.90E-02	1.18E-01	2.06E-02	3.34E+00
Pu-240	1.46E-03	9.02E-03	1.58E-03	2.56E-01
Pu-241	1.25E-01	7.76E-01	1.36E-01	2.20E+01
Pu-242	4.01E-07	2.48E-06	4.34E-07	7.04E-05
Pu-244	2.65E-16	1.64E-15	2.87E-16	4.66E-14
Am-241	6.28E-04	3.89E-03	6.79E-04	1.10E-01
Am-243	1.70E-06	1.05E-05	1.84E-06	2.98E-04
Cm-243	4.84E-07	2.99E-06	5.23E-07	8.49E-05
Cm-244	3.07E-05	1.90E-04	3.32E-05	5.39E-03
Cm-245	7.53E-10	4.66E-09	8.14E-10	1.32E-07
Cm-246	7.04E-12	4.36E-11	7.61E-12	1.24E-09
Cm-247	2.54E-18	1.57E-17	2.74E-18	4.45E-16
Cm-248	2.36E-19	1.46E-18	2.55E-19	4.14E-17
Totals =	2.28E+00	1.41E+01	2.46E+00	4.00E+02

File = "NEW General Plant Waste.xls"

B-7. A SUMMARY OF THE TOTAL RADIOACTIVE INVENTORY DISPOSED AT THE RWMC FROM ALL ANL-W WASTE STREAMS

A summary of all radioactive wastes disposed at the RWMC from all of the previously discussed ANL-W waste streams is shown in Table B-30. The individual or yearly results are shown in Tables B-31 (best-estimate), B-32 (lower-bound), and B-33 (upper-bound).

Table B-30. Total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	Lower Bound (Ci)	Best Estimate (Ci)	Upper Bound (Ci)		Nuclide	Lower Bound (Ci)	Best Estimate (Ci)	Upper Bound (Ci)
H-3	3.61E+01	1.49E+02	7.01E+02		U-232	1.58E-03	3.17E-03	6.34E-03
C-14	1.57E+01	3.15E+01	6.33E+01		U-233	1.28E-04	2.57E-04	5.14E-04
Cl-36	3.94E-03	7.98E-03	2.72E-02		U-234	1.98E+00	3.39E+00	5.93E+00
Co-60	7.72E+05	1.54E+06	3.09E+06		U-235	1.14E-01	1.47E-01	1.93E-01
Ni-59	8.23E+01	1.65E+02	3.32E+02		U-236	5.40E-02	1.08E-01	2.16E-01
Ni-63	6.01E+03	1.20E+04	2.40E+04		U-238	9.23E-01	1.39E+00	2.09E+00
Sr-90	1.00E+04	2.01E+04	4.01E+04		Np-237	1.72E-02	3.13E-02	5.82E-02
Nb-94	2.69E+00	5.38E+00	1.08E+01		Pu-238	3.84E+00	1.15E+01	3.46E+01
Tc-99	8.26E+00	1.65E+01	3.30E+01		Pu-239	2.64E+02	5.11E+02	9.97E+02
I-129	3.50E-03	7.01E-03	1.40E-02		Pu-240	7.04E-01	7.04E+00	7.04E+01
Cs-137	1.39E+04	2.78E+04	5.55E+04		Pu-241	2.42E+00	1.21E+02	6.06E+03
Eu-152	2.82E-01	1.41E+00	7.05E+00		Pu-242	1.94E-04	1.94E-03	1.94E-02
Eu-154	2.94E+01	1.47E+02	7.36E+02		Pu-244	1.28E-13	1.28E-12	1.28E-11
Pb-210	3.20E-09	3.20E-08	3.20E-07		Am-241	3.03E-01	3.03E+00	3.03E+01
Ra-226	1.33E-01	2.00E-01	3.00E-01		Am-243	3.28E-05	1.64E-03	8.20E-02
Ra-228	9.69E-13	3.36E-11	2.09E-09		Cm-243	9.34E-06	4.67E-04	2.34E-02
Ac-227	4.93E-07	9.85E-06	1.97E-04		Cm-244	1.48E-04	1.48E-02	1.48E+00
Th-228	5.79E-05	2.90E-03	1.45E-01		Cm-245	1.45E-08	7.27E-07	3.64E-05
Th-229	1.16E-07	3.47E-07	1.04E-06		Cm-246	1.36E-10	6.80E-09	3.40E-07
Th-230	6.85E-05	1.37E-04	2.74E-04		Cm-247	3.06E-16	6.12E-15	1.22E-13
Th-232	3.05E-04	9.62E-04	3.96E-03		Cm-248	1.14E-16	1.14E-15	1.14E-14
Pa-231	9.25E-06	4.63E-05	2.31E-04		Totals =	8.02E+05	1.60E+06	3.24E+06

Table B-31. Best-estimate total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)
H-3	1.85E-03	1.59E-01	3.35E-01	2.14E-01	3.67E+00	5.09E-01	5.91E+00	1.63E+01
C-14	1.26E-06	1.08E-04	2.28E-04	1.46E-04	2.50E-03	3.46E-04	4.03E-03	1.11E-02
Cl-36	1.56E-09	1.33E-07	2.82E-07	1.80E-07	3.09E-06	4.28E-07	4.97E-06	1.37E-05
Co-60	7.23E-03	6.19E-01	1.31E+00	8.36E-01	1.43E+01	1.99E+00	2.31E+01	6.36E+01
Ni-59	3.78E-06	3.24E-04	6.85E-04	4.37E-04	7.50E-03	1.04E-03	1.21E-02	3.33E-02
Ni-63	1.46E-04	1.25E-02	2.64E-02	1.69E-02	2.89E-01	4.01E-02	4.66E-01	1.28E+00
Sr-90	2.73E-01	2.34E+01	4.94E+01	3.16E+01	5.41E+02	7.50E+01	8.71E+02	2.40E+03
Nb-94	2.08E-07	1.78E-05	3.77E-05	2.41E-05	4.13E-04	5.72E-05	6.65E-04	1.83E-03
Tc-99	4.61E-05	3.95E-03	8.35E-03	5.34E-03	9.15E-02	1.27E-02	1.47E-01	4.06E-01
I-129	9.53E-08	8.15E-06	1.72E-05	1.10E-05	1.89E-04	2.62E-05	3.04E-04	8.38E-04
Cs-137	3.77E-01	3.23E+01	6.83E+01	4.37E+01	7.48E+02	1.04E+02	1.21E+03	3.32E+03
Eu-152	1.92E-05	1.64E-03	3.47E-03	2.22E-03	3.80E-02	5.27E-03	6.12E-02	1.69E-01
Eu-154	2.00E-03	1.71E-01	3.62E-01	2.31E-01	3.97E+00	5.49E-01	6.39E+00	1.76E+01
Pb-210	4.35E-13	3.72E-11	7.87E-11	5.03E-11	8.62E-10	1.19E-10	1.39E-09	3.83E-09
Ra-226	4.06E-12	3.47E-10	7.34E-10	4.69E-10	8.04E-09	1.11E-09	1.29E-08	3.57E-08
Ra-228	4.57E-16	3.91E-14	8.27E-14	5.28E-14	9.05E-13	1.25E-13	1.46E-12	4.02E-12
Ac-227	1.34E-10	1.15E-08	2.42E-08	1.55E-08	2.65E-07	3.68E-08	4.28E-07	1.18E-06
Th-228	3.94E-08	3.37E-06	7.13E-06	4.56E-06	7.81E-05	1.08E-05	1.26E-04	3.47E-04
Th-229	4.72E-12	4.04E-10	8.55E-10	5.46E-10	9.36E-09	1.30E-09	1.51E-08	4.16E-08
Th-230	1.86E-09	1.59E-07	3.37E-07	2.15E-07	3.69E-06	5.12E-07	5.95E-06	1.64E-05
Th-232	9.79E-09	8.38E-07	1.77E-06	1.13E-06	1.94E-05	2.69E-06	3.13E-05	2.07E-04
Pa-231	6.29E-10	5.38E-08	1.14E-07	7.27E-08	1.25E-06	1.73E-07	2.01E-06	5.54E-06
U-232	4.31E-08	3.69E-06	7.80E-06	4.98E-06	8.54E-05	1.18E-05	1.38E-04	3.79E-04
U-233	3.49E-09	2.99E-07	6.32E-07	4.04E-07	6.92E-06	9.59E-07	1.11E-05	3.07E-05
U-234	2.28E-05	1.95E-03	4.12E-03	2.64E-03	5.56E-02	3.05E-01	7.27E-02	2.70E-01
U-235	9.29E-07	7.96E-05	1.68E-04	1.08E-04	2.32E-03	1.39E-02	2.97E-03	1.14E-02
U-236	1.47E-06	1.26E-04	2.66E-04	1.70E-04	2.91E-03	4.03E-04	4.68E-03	1.29E-02
U-238	1.78E-07	1.53E-05	3.23E-05	2.06E-05	1.08E-02	3.00E-01	5.70E-04	5.00E-02
Np-237	3.04E-07	2.60E-05	5.50E-05	3.51E-05	6.02E-04	8.34E-05	9.69E-04	2.67E-03
Pu-238	1.57E-04	1.34E-02	2.84E-02	1.81E-02	3.11E-01	4.30E-02	5.00E-01	1.38E+00
Pu-239	6.25E-03	5.35E-01	1.13E+00	7.23E-01	1.24E+01	1.72E+00	2.00E+01	7.43E+01
Pu-240	9.57E-05	8.19E-03	1.73E-02	1.11E-02	1.90E-01	2.63E-02	3.06E-01	8.42E-01
Pu-241	1.65E-03	1.41E-01	2.98E-01	1.90E-01	3.26E+00	4.52E-01	5.26E+00	1.45E+01
Pu-242	2.63E-08	2.25E-06	4.77E-06	3.04E-06	5.22E-05	7.23E-06	8.41E-05	2.32E-04
Pu-244	1.74E-17	1.49E-15	3.15E-15	2.01E-15	3.45E-14	4.78E-15	5.56E-14	1.53E-13
Am-241	4.12E-05	3.53E-03	7.47E-03	4.77E-03	8.17E-02	1.13E-02	1.32E-01	3.63E-01
Am-243	2.23E-08	1.91E-06	4.04E-06	2.58E-06	4.42E-05	6.12E-06	7.12E-05	1.96E-04
Cm-243	6.35E-09	5.44E-07	1.15E-06	7.34E-07	1.26E-05	1.74E-06	2.03E-05	5.59E-05
Cm-244	2.01E-07	1.72E-05	3.65E-05	2.33E-05	3.99E-04	5.53E-05	6.43E-04	1.77E-03
Cm-245	9.89E-12	8.47E-10	1.79E-09	1.14E-09	1.96E-08	2.72E-09	3.16E-08	8.70E-08
Cm-246	9.24E-14	7.91E-12	1.67E-11	1.07E-11	1.83E-10	2.54E-11	2.95E-10	8.14E-10
Cm-247	8.32E-20	7.13E-18	1.51E-17	9.63E-18	1.65E-16	2.29E-17	2.66E-16	7.33E-16
Cm-248	1.55E-20	1.32E-18	2.80E-18	1.79E-18	3.07E-17	4.25E-18	4.94E-17	1.36E-16
Totals =	6.78E-01	5.81E+01	1.23E+02	7.84E+01	1.34E+03	1.87E+02	2.16E+03	5.99E+03

Table B-31 (Part 2). Best-estimate total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)
H-3	3.17E+01	1.41E+01	4.80E+00	1.16E+01	6.32E+00	5.28E+00	1.24E+00	3.29E+00
C-14	2.16E-02	9.61E-03	3.27E-03	7.92E-03	4.31E-03	3.60E-03	8.46E-04	2.24E-03
Cl-36	2.67E-05	1.19E-05	4.04E-06	9.77E-06	5.32E-06	4.44E-06	1.04E-06	2.76E-06
Co-60	1.24E+02	5.51E+01	1.87E+01	4.54E+01	2.47E+01	2.06E+01	4.85E+00	1.28E+01
Ni-59	6.47E-02	2.88E-02	9.80E-03	2.37E-02	1.29E-02	1.08E-02	2.54E-03	6.71E-03
Ni-63	2.50E+00	1.11E+00	3.78E-01	9.16E-01	4.98E-01	4.16E-01	9.78E-02	2.59E-01
Sr-90	4.67E+03	2.08E+03	7.07E+02	1.71E+03	9.32E+02	7.79E+02	1.83E+02	4.85E+02
Nb-94	3.56E-03	1.59E-03	5.40E-04	1.31E-03	7.11E-04	5.94E-04	1.40E-04	3.70E-04
Tc-99	7.90E-01	3.52E-01	1.20E-01	2.90E-01	1.58E-01	1.32E-01	3.09E-02	8.19E-02
I-129	1.63E-03	7.26E-04	2.47E-04	5.98E-04	3.25E-04	2.72E-04	6.39E-05	1.69E-04
Cs-137	6.46E+03	2.88E+03	9.79E+02	2.37E+03	1.29E+03	1.08E+03	2.53E+02	6.70E+02
Eu-152	3.28E-01	1.46E-01	4.97E-02	1.20E-01	6.55E-02	5.47E-02	1.29E-02	3.40E-02
Eu-154	3.42E+01	1.52E+01	5.19E+00	1.26E+01	6.83E+00	5.71E+00	1.34E+00	3.55E+00
Pb-210	7.44E-09	3.31E-09	1.13E-09	2.73E-09	1.48E-09	1.24E-09	2.91E-10	7.72E-10
Ra-226	6.94E-08	3.09E-08	1.05E-08	2.55E-08	1.39E-08	1.16E-08	2.72E-09	3.72E-08
Ra-228	7.82E-12	3.48E-12	1.18E-12	2.87E-12	1.56E-12	1.30E-12	3.06E-13	8.11E-13
Ac-227	2.29E-06	1.02E-06	3.47E-07	8.41E-07	4.57E-07	3.82E-07	8.98E-08	2.38E-07
Th-228	6.74E-04	3.00E-04	1.02E-04	2.47E-04	1.35E-04	1.12E-04	2.64E-05	6.99E-05
Th-229	8.09E-08	3.60E-08	1.22E-08	2.97E-08	1.61E-08	1.35E-08	3.17E-09	8.39E-09
Th-230	3.19E-05	1.42E-05	4.83E-06	1.17E-05	6.36E-06	5.31E-06	1.25E-06	3.31E-06
Th-232	2.89E-04	7.46E-05	2.54E-05	6.15E-05	3.34E-05	2.79E-05	6.57E-06	1.74E-05
Pa-231	1.08E-05	4.79E-06	1.63E-06	3.95E-06	2.15E-06	1.79E-06	4.22E-07	1.12E-06
U-232	7.37E-04	3.28E-04	1.12E-04	2.70E-04	1.47E-04	1.23E-04	2.89E-05	7.65E-05
U-233	5.98E-05	2.66E-05	9.05E-06	2.19E-05	1.19E-05	9.97E-06	2.34E-06	6.20E-06
U-234	4.38E-01	2.52E-01	7.73E-02	2.02E-01	9.03E-02	6.50E-02	1.53E-02	4.05E-02
U-235	1.81E-02	1.07E-02	3.24E-03	8.53E-03	3.75E-03	2.65E-03	6.23E-04	1.65E-03
U-236	2.51E-02	1.12E-02	3.80E-03	9.21E-03	5.01E-03	4.19E-03	9.84E-04	2.61E-03
U-238	9.94E-03	2.79E-01	6.37E-02	1.54E-03	4.47E-02	5.09E-04	1.20E-04	3.17E-04
Np-237	5.20E-03	2.31E-03	7.87E-04	1.91E-03	1.04E-03	8.67E-04	2.04E-04	5.39E-04
Pu-238	2.68E+00	1.19E+00	4.06E-01	9.84E-01	5.35E-01	4.47E-01	1.05E-01	2.78E-01
Pu-239	1.39E+02	4.77E+01	1.62E+01	3.93E+01	2.14E+01	1.78E+01	4.19E+00	1.11E+01
Pu-240	1.64E+00	7.30E-01	2.48E-01	6.01E-01	3.27E-01	2.73E-01	6.42E-02	1.70E-01
Pu-241	2.82E+01	1.26E+01	4.27E+00	1.03E+01	5.62E+00	4.70E+00	1.10E+00	2.92E+00
Pu-242	4.51E-04	2.01E-04	6.82E-05	1.65E-04	8.99E-05	7.51E-05	1.77E-05	4.67E-05
Pu-244	2.98E-13	1.33E-13	4.51E-14	1.09E-13	5.95E-14	4.97E-14	1.17E-14	3.09E-14
Am-241	7.06E-01	3.14E-01	1.07E-01	2.59E-01	1.41E-01	1.18E-01	2.77E-02	7.32E-02
Am-243	3.82E-04	1.70E-04	5.78E-05	1.40E-04	7.62E-05	6.36E-05	1.49E-05	3.96E-05
Cm-243	1.09E-04	4.84E-05	1.65E-05	3.99E-05	2.17E-05	1.81E-05	4.26E-06	1.13E-05
Cm-244	3.45E-03	1.54E-03	5.22E-04	1.26E-03	6.88E-04	5.75E-04	1.35E-04	3.58E-04
Cm-245	1.69E-07	7.54E-08	2.56E-08	6.21E-08	3.38E-08	2.82E-08	6.63E-09	1.76E-08
Cm-246	1.58E-09	7.05E-10	2.40E-10	5.80E-10	3.16E-10	2.64E-10	6.20E-11	1.64E-10
Cm-247	1.42E-15	6.34E-16	2.16E-16	5.22E-16	2.84E-16	2.38E-16	5.58E-17	1.48E-16
Cm-248	2.65E-16	1.18E-16	4.01E-17	9.71E-17	5.28E-17	4.41E-17	1.04E-17	2.75E-17
Totals =	1.16E+04	5.17E+03	1.76E+03	4.26E+03	2.32E+03	1.93E+03	4.55E+02	1.20E+03

Table B-31 (Part 3). Best-estimate total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)
H-3	2.93E+00	1.75E+00	1.18E+00	3.26E-01	3.97E-01	1.63E+00	3.06E-01	1.41E+01
C-14	2.00E-03	3.23E+00	2.39E+00	3.92E+00	2.49E+00	1.24E+00	1.64E+00	1.14E+00
Cl-36	2.47E-06	7.87E-04	6.06E-04	7.12E-04	5.36E-04	5.06E-04	4.63E-04	4.51E-04
Co-60	1.15E+01	1.66E+05	1.22E+05	1.96E+05	1.17E+05	6.14E+04	8.47E+04	6.14E+04
Ni-59	5.99E-03	1.68E+01	1.25E+01	2.22E+01	1.49E+01	5.55E+00	8.23E+00	5.59E+00
Ni-63	2.31E-01	1.23E+03	9.25E+02	1.63E+03	1.07E+03	4.02E+02	6.04E+02	4.08E+02
Sr-90	4.32E+02	2.58E+02	1.74E+02	4.63E+01	5.85E+01	7.86E+01	1.72E+01	3.04E+02
Nb-94	3.30E-04	5.51E-01	4.14E-01	7.39E-01	4.89E-01	1.72E-01	2.69E-01	1.79E-01
Tc-99	7.31E-02	1.40E+00	1.05E+00	1.80E+00	1.18E+00	4.48E-01	6.67E-01	5.00E-01
I-129	1.51E-04	8.99E-05	6.08E-05	1.62E-05	2.04E-05	2.74E-05	5.99E-06	1.06E-04
Cs-137	5.98E+02	3.56E+02	2.41E+02	6.41E+01	8.09E+01	1.09E+02	2.37E+01	4.20E+02
Eu-152	3.04E-02	1.81E-02	1.22E-02	3.26E-03	4.11E-03	5.52E-03	1.21E-03	2.14E-02
Eu-154	3.17E+00	1.89E+00	1.28E+00	3.40E-01	4.29E-01	5.76E-01	1.26E-01	2.23E+00
Pb-210	6.89E-10	4.10E-10	2.78E-10	7.38E-11	9.32E-11	1.25E-10	2.73E-11	4.84E-10
Ra-226	2.00E-01	3.83E-09	2.59E-09	6.89E-10	8.69E-10	1.00E-06	2.55E-10	4.52E-09
Ra-228	7.24E-13	4.31E-13	2.92E-13	7.76E-14	9.79E-14	1.32E-13	2.87E-14	5.09E-13
Ac-227	2.12E-07	1.26E-07	8.55E-08	2.27E-08	2.87E-08	3.86E-08	8.42E-09	1.49E-07
Th-228	6.24E-05	3.72E-05	2.52E-05	6.69E-06	8.44E-06	1.13E-05	2.48E-06	4.39E-05
Th-229	7.49E-09	4.46E-09	3.02E-09	8.02E-10	1.01E-09	1.36E-09	2.97E-10	5.26E-09
Th-230	2.95E-06	1.76E-06	1.19E-06	3.16E-07	3.99E-07	5.36E-07	1.17E-07	2.07E-06
Th-232	1.55E-05	9.25E-06	6.25E-06	1.66E-06	2.10E-06	2.82E-06	6.16E-07	1.09E-05
Pa-231	9.96E-07	5.94E-07	4.02E-07	1.07E-07	1.35E-07	1.81E-07	3.95E-08	7.00E-07
U-232	6.82E-05	4.07E-05	2.75E-05	7.31E-06	9.23E-06	1.24E-05	2.71E-06	4.80E-05
U-233	5.53E-06	3.30E-06	2.23E-06	5.93E-07	7.48E-07	1.01E-06	2.20E-07	3.89E-06
U-234	7.89E-02	2.99E-02	3.98E-02	4.87E-02	7.48E-03	6.56E-03	1.73E-02	3.85E-02
U-235	3.43E-03	1.26E-03	1.75E-03	2.21E-03	3.18E-04	2.68E-04	7.84E-04	1.64E-03
U-236	2.32E-03	1.39E-03	9.37E-04	2.49E-04	3.14E-04	4.23E-04	9.22E-05	1.63E-03
U-238	1.51E-01	2.98E-02	8.94E-02	1.58E-01	9.21E-03	5.14E-05	5.60E-02	4.67E-02
Np-237	4.81E-04	2.87E-04	1.94E-04	5.16E-05	6.51E-05	4.46E-03	1.91E-05	3.38E-04
Pu-238	2.48E-01	1.48E-01	1.00E-01	2.66E-02	3.36E-02	4.51E-02	9.85E-03	1.75E-01
Pu-239	9.91E+00	5.90E+00	3.99E+00	1.06E+00	1.34E+00	1.80E+00	3.93E-01	6.96E+00
Pu-240	1.52E-01	9.04E-02	6.11E-02	1.63E-02	2.05E-02	2.76E-02	6.02E-03	1.07E-01
Pu-241	2.61E+00	1.55E+00	1.05E+00	2.80E-01	3.53E-01	4.74E-01	1.03E-01	1.83E+00
Pu-242	4.17E-05	2.49E-05	1.68E-05	4.47E-06	5.64E-06	7.58E-06	1.65E-06	2.93E-05
Pu-244	2.76E-14	1.64E-14	1.11E-14	2.96E-15	3.73E-15	5.01E-15	1.09E-15	1.94E-14
Am-241	6.53E-02	3.89E-02	2.63E-02	7.00E-03	8.84E-03	1.19E-02	2.59E-03	4.59E-02
Am-243	3.53E-05	2.11E-05	1.42E-05	3.79E-06	4.78E-06	6.42E-06	1.40E-06	2.48E-05
Cm-243	1.01E-05	6.00E-06	4.05E-06	1.08E-06	1.36E-06	1.83E-06	3.99E-07	7.07E-06
Cm-244	3.19E-04	1.90E-04	1.29E-04	3.42E-05	4.32E-05	5.80E-05	1.27E-05	2.24E-04
Cm-245	1.57E-08	9.34E-09	6.31E-09	1.68E-09	2.12E-09	2.85E-09	6.22E-10	1.10E-08
Cm-246	1.46E-10	8.73E-11	5.90E-11	1.57E-11	1.98E-11	2.66E-11	5.81E-12	1.03E-10
Cm-247	1.32E-16	7.86E-17	5.31E-17	1.41E-17	1.78E-17	2.40E-17	5.23E-18	9.27E-17
Cm-248	2.45E-17	1.46E-17	9.87E-18	2.63E-18	3.31E-18	4.45E-18	9.72E-19	1.72E-17
Totals =	1.07E+03	1.68E+05	1.23E+05	1.98E+05	1.18E+05	6.20E+04	8.54E+04	6.26E+04

Table B-31 (Part 4). Best-estimate total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)
H-3	7.98E-01	2.92E-01	4.19E-01	6.00E-01	1.91E+01	8.99E-02	6.26E-03	2.82E-03
C-14	1.55E+00	1.83E+00	1.67E+00	2.57E+00	1.24E+00	2.10E+00	1.63E+00	1.01E+00
Cl-36	4.63E-04	4.00E-04	4.37E-04	5.96E-04	4.12E-04	3.18E-04	5.02E-04	2.37E-04
Co-60	6.96E+04	9.10E+04	8.01E+04	1.28E+05	6.32E+04	1.00E+05	7.72E+04	4.87E+04
Ni-59	6.97E+00	9.94E+00	8.27E+00	1.31E+01	6.52E+00	1.21E+01	8.16E+00	5.80E+00
Ni-63	5.00E+02	7.26E+02	6.02E+02	9.59E+02	4.73E+02	8.76E+02	5.91E+02	4.21E+02
Sr-90	1.18E+02	4.30E+01	6.17E+01	8.84E+01	2.82E+03	1.33E+01	9.23E-01	4.16E-01
Nb-94	2.18E-01	3.26E-01	2.67E-01	4.28E-01	2.12E-01	3.99E-01	2.61E-01	1.90E-01
Tc-99	5.57E-01	8.02E-01	6.66E-01	1.07E+00	9.93E-01	9.61E-01	6.40E-01	4.60E-01
I-129	4.10E-05	1.50E-05	2.16E-05	3.09E-05	9.83E-04	4.63E-06	3.22E-07	1.45E-07
Cs-137	1.63E+02	5.95E+01	8.54E+01	1.22E+02	3.90E+03	1.83E+01	1.28E+00	5.75E-01
Eu-152	8.26E-03	3.02E-03	4.34E-03	6.21E-03	1.98E-01	9.31E-04	6.49E-05	2.92E-05
Eu-154	8.62E-01	3.15E-01	4.53E-01	6.48E-01	2.06E+01	9.71E-02	6.77E-03	3.05E-03
Pb-210	1.87E-10	6.85E-11	9.84E-11	1.41E-10	4.49E-09	2.11E-11	1.47E-12	6.62E-13
Ra-226	1.75E-09	6.39E-10	9.18E-10	1.31E-09	4.19E-08	1.97E-10	1.37E-11	6.18E-12
Ra-228	1.97E-13	7.20E-14	1.03E-13	1.48E-13	4.71E-12	2.22E-14	1.54E-15	6.96E-16
Ac-227	5.77E-08	2.11E-08	3.03E-08	4.34E-08	1.38E-06	6.50E-09	4.53E-10	2.04E-10
Th-228	1.70E-05	6.21E-06	8.91E-06	1.28E-05	4.07E-04	1.91E-06	1.33E-07	6.00E-08
Th-229	2.04E-09	7.44E-10	1.07E-09	1.53E-09	4.88E-08	2.29E-10	1.60E-11	7.20E-12
Th-230	8.02E-07	2.93E-07	4.21E-07	6.03E-07	1.92E-05	9.04E-08	6.30E-09	2.84E-09
Th-232	4.22E-06	1.54E-06	2.22E-06	3.17E-06	1.01E-04	4.76E-07	3.31E-08	1.49E-08
Pa-231	2.71E-07	9.91E-08	1.42E-07	2.04E-07	6.49E-06	3.05E-08	2.13E-09	9.58E-10
U-232	1.86E-05	6.79E-06	9.75E-06	1.40E-05	4.45E-04	2.09E-06	1.46E-07	6.56E-08
U-233	1.50E-06	5.50E-07	7.90E-07	1.13E-06	3.60E-05	1.70E-07	1.18E-08	5.32E-09
U-234	5.26E-02	1.29E-02	7.04E-02	2.86E-01	6.25E-01	1.16E-01	1.59E-02	5.83E-03
U-235	2.34E-03	5.69E-04	3.17E-03	1.29E-02	2.72E-02	5.25E-03	7.18E-04	2.64E-04
U-236	6.32E-04	2.31E-04	3.32E-04	4.75E-04	1.51E-02	7.12E-05	4.96E-06	2.23E-06
U-238	3.49E-02	1.38E-04	4.22E-03	3.21E-02	7.87E-03	3.21E-03	5.37E-05	1.17E-04
Np-237	1.31E-04	4.78E-05	6.87E-05	9.84E-05	3.13E-03	1.47E-05	1.03E-06	4.62E-07
Pu-238	6.75E-02	2.47E-02	3.55E-02	5.08E-02	1.62E+00	7.61E-03	5.30E-04	2.39E-04
Pu-239	2.69E+00	9.85E-01	1.41E+00	2.03E+00	6.45E+01	3.04E-01	2.11E-02	9.52E-03
Pu-240	4.12E-02	1.51E-02	2.17E-02	3.10E-02	9.88E-01	4.65E-03	3.24E-04	1.46E-04
Pu-241	7.09E-01	2.59E-01	3.73E-01	5.33E-01	1.70E+01	8.00E-02	5.57E-03	2.51E-03
Pu-242	1.13E-05	4.15E-06	5.96E-06	8.53E-06	2.72E-04	1.28E-06	8.90E-08	4.01E-08
Pu-244	7.50E-15	2.74E-15	3.94E-15	5.64E-15	1.80E-13	8.45E-16	5.89E-17	2.65E-17
Am-241	1.78E-02	6.50E-03	9.33E-03	1.34E-02	4.26E-01	2.00E-03	1.39E-04	6.28E-05
Am-243	9.61E-06	3.51E-06	5.05E-06	7.22E-06	2.30E-04	1.08E-06	7.54E-08	3.40E-08
Cm-243	2.74E-06	1.00E-06	1.44E-06	2.06E-06	6.55E-05	3.08E-07	2.15E-08	9.67E-09
Cm-244	8.68E-05	3.17E-05	4.56E-05	6.53E-05	2.08E-03	9.78E-06	6.81E-07	3.07E-07
Cm-245	4.26E-09	1.56E-09	2.24E-09	3.20E-09	1.02E-07	4.80E-10	3.34E-11	1.51E-11
Cm-246	3.98E-11	1.46E-11	2.09E-11	3.00E-11	9.54E-10	4.49E-12	3.13E-13	1.41E-13
Cm-247	3.59E-17	1.31E-17	1.88E-17	2.70E-17	8.59E-16	4.04E-18	2.82E-19	1.27E-19
Cm-248	6.66E-18	2.44E-18	3.50E-18	5.01E-18	1.60E-16	7.51E-19	5.23E-20	2.36E-20
Totals =	7.04E+04	9.18E+04	8.09E+04	1.29E+05	7.75E+04	1.01E+05	7.78E+04	4.91E+04

Table B-31 (Part 5). Best-estimate total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1992	1993	Total 1960–1983	Total 1984–1993	Total 1960–1993
	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
H-3	1.06E-01	3.05E-03	1.28E+02	2.14E+01	1.49E+02
C-14	9.11E-01	8.47E-01	1.61E+01	1.54E+01	3.15E+01
Cl-36	2.36E-04	2.32E-04	4.15E-03	3.83E-03	7.98E-03
Co-60	3.93E+04	3.78E+04	8.09E+05	7.35E+05	1.54E+06
Ni-59	4.20E+00	3.92E+00	8.60E+01	7.89E+01	1.65E+02
Ni-63	3.00E+02	2.82E+02	6.28E+03	5.73E+03	1.20E+04
Sr-90	1.57E+01	4.50E-01	1.69E+04	3.16E+03	2.01E+04
Nb-94	1.32E-01	1.23E-01	2.83E+00	2.56E+00	5.38E+00
Tc-99	3.24E-01	3.03E-01	9.74E+00	6.77E+00	1.65E+01
I-129	5.46E-06	1.57E-07	5.90E-03	1.10E-03	7.01E-03
Cs-137	2.17E+01	6.22E-01	2.34E+04	4.37E+03	2.78E+04
Eu-152	1.10E-03	3.16E-05	1.19E+00	2.22E-01	1.41E+00
Eu-154	1.15E-01	3.30E-03	1.24E+02	2.32E+01	1.47E+02
Pb-210	2.49E-11	7.16E-13	2.69E-08	5.03E-09	3.20E-08
Ra-226	2.33E-10	6.68E-12	2.00E-01	4.69E-08	2.00E-01
Ra-228	2.62E-14	7.52E-16	2.83E-11	5.29E-12	3.36E-11
Ac-227	7.68E-09	2.21E-10	8.30E-06	1.55E-06	9.85E-06
Th-228	2.26E-06	6.49E-08	2.44E-03	4.56E-04	2.90E-03
Th-229	2.71E-10	7.78E-12	2.93E-07	5.47E-08	3.47E-07
Th-230	1.07E-07	3.07E-09	1.15E-04	2.16E-05	1.37E-04
Th-232	5.62E-07	1.61E-08	8.49E-04	1.13E-04	9.62E-04
Pa-231	3.61E-08	1.04E-09	3.90E-05	7.28E-06	4.63E-05
U-232	2.47E-06	7.10E-08	2.67E-03	4.99E-04	3.17E-03
U-233	2.00E-07	5.75E-09	2.16E-04	4.04E-05	2.57E-04
U-234	1.97E-02	3.08E-02	2.16E+00	1.23E+00	3.39E+00
U-235	8.87E-04	1.39E-03	9.18E-02	5.47E-02	1.47E-01
U-236	8.42E-05	2.42E-06	9.09E-02	1.70E-02	1.08E-01
U-238	3.82E-03	7.39E-05	1.30E+00	8.65E-02	1.39E+00
Np-237	1.74E-05	5.00E-07	2.32E-02	3.51E-03	2.67E-02
Pu-238	8.99E-03	2.58E-04	9.71E+00	1.81E+00	1.15E+01
Pu-239	3.59E-01	1.03E-02	4.39E+02	7.24E+01	5.11E+02
Pu-240	5.49E-03	1.58E-04	5.93E+00	1.11E+00	7.04E+00
Pu-241	9.45E-02	2.71E-03	1.02E+02	1.91E+01	1.21E+02
Pu-242	1.51E-06	4.34E-08	1.63E-03	3.05E-04	1.94E-03
Pu-244	9.99E-16	2.87E-17	1.08E-12	2.01E-13	1.28E-12
Am-241	2.37E-03	6.79E-05	2.56E+00	4.77E-01	3.03E+00
Am-243	1.28E-06	3.67E-08	1.38E-03	2.58E-04	1.64E-03
Cm-243	3.64E-07	1.05E-08	3.94E-04	7.35E-05	4.67E-04
Cm-244	1.16E-05	3.32E-07	1.25E-02	2.33E-03	1.48E-02
Cm-245	5.67E-10	1.63E-11	6.13E-07	1.14E-07	7.27E-07
Cm-246	5.30E-12	1.52E-13	5.73E-09	1.07E-09	6.80E-09
Cm-247	4.77E-18	1.37E-19	5.16E-15	9.63E-16	6.12E-15
Cm-248	8.87E-19	2.55E-20	9.59E-16	1.79E-16	1.14E-15
Totals =	3.96E+04	3.81E+04	8.56E+05	7.48E+05	1.60E+06

File = "NEW Best-estimate Totals.xls"

Table B-32. Lower-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)
H-3	3.70E-04	3.17E-02	6.70E-02	4.28E-02	7.34E-01	1.02E-01	1.18E+00	3.26E+00
C-14	2.52E-07	2.16E-05	4.57E-05	2.92E-05	5.00E-04	6.93E-05	8.05E-04	2.22E-03
Cl-36	1.56E-11	1.33E-09	2.82E-09	1.80E-09	3.09E-08	4.28E-09	4.97E-08	1.37E-07
Co-60	7.23E-04	6.19E-02	1.31E-01	8.36E-02	1.43E+00	1.99E-01	2.31E+00	6.36E+00
Ni-59	3.78E-07	3.24E-05	6.85E-05	4.37E-05	7.50E-04	1.04E-04	1.21E-03	3.33E-03
Ni-63	7.29E-05	6.24E-03	1.32E-02	8.43E-03	1.45E-01	2.00E-02	2.33E-01	6.42E-01
Sr-90	1.36E-01	1.17E+01	2.47E+01	1.58E+01	2.70E+02	3.75E+01	4.36E+02	1.20E+03
Nb-94	6.94E-08	5.94E-06	1.26E-05	8.03E-06	1.38E-04	1.91E-05	2.22E-04	6.11E-04
Tc-99	2.31E-05	1.98E-03	4.18E-03	2.67E-03	4.57E-02	6.34E-03	7.37E-02	2.03E-01
I-129	4.76E-08	4.08E-06	8.62E-06	5.51E-06	9.44E-05	1.31E-05	1.52E-04	4.19E-04
Cs-137	1.89E-01	1.62E+01	3.42E+01	2.18E+01	3.74E+02	5.18E+01	6.03E+02	1.66E+03
Eu-152	3.83E-06	3.28E-04	6.94E-04	4.44E-04	7.60E-03	1.05E-03	1.22E-02	3.38E-02
Eu-154	4.00E-04	3.43E-02	7.24E-02	4.63E-02	7.93E-01	1.10E-01	1.28E+00	3.52E+00
Pb-210	4.35E-14	3.72E-12	7.87E-12	5.03E-12	8.62E-11	1.19E-11	1.39E-10	3.83E-10
Ra-226	2.07E-13	4.12E-11	3.70E-11	9.26E-11	1.47E-09	6.71E-11	8.18E-10	2.70E-09
Ra-228	4.69E-18	1.11E-15	8.37E-16	2.61E-15	4.11E-14	1.60E-15	1.97E-14	6.78E-14
Ac-227	6.70E-12	5.73E-10	1.21E-09	7.75E-10	1.33E-08	1.84E-09	2.14E-08	5.90E-08
Th-228	7.88E-10	6.75E-08	1.43E-07	9.11E-08	1.56E-06	2.16E-07	2.52E-06	6.93E-06
Th-229	1.57E-12	1.35E-10	2.85E-10	1.82E-10	3.12E-09	4.33E-10	5.03E-09	1.39E-08
Th-230	9.31E-10	7.97E-08	1.69E-07	1.08E-07	1.85E-06	2.56E-07	2.97E-06	8.20E-06
Th-232	1.96E-09	1.68E-07	3.55E-07	2.27E-07	3.88E-06	5.38E-07	6.25E-06	9.79E-05
Pa-231	1.26E-10	1.08E-08	2.28E-08	1.45E-08	2.49E-07	3.46E-08	4.02E-07	1.11E-06
U-232	2.15E-08	1.84E-06	3.90E-06	2.49E-06	4.27E-05	5.92E-06	6.88E-05	1.90E-04
U-233	1.75E-09	1.49E-07	3.16E-07	2.02E-07	3.46E-06	4.80E-07	5.57E-06	1.54E-05
U-234	1.14E-05	9.75E-04	2.06E-03	1.32E-03	2.95E-02	2.02E-01	3.64E-02	1.47E-01
U-235	8.45E-07	7.23E-05	1.53E-04	9.77E-05	1.99E-03	9.35E-03	2.70E-03	9.57E-03
U-236	7.34E-07	6.28E-05	1.33E-04	8.49E-05	1.45E-03	2.02E-04	2.34E-03	6.46E-03
U-238	8.92E-08	7.64E-06	1.62E-05	1.03E-05	7.15E-03	2.00E-01	2.85E-04	3.31E-02
Np-237	1.52E-07	1.30E-05	2.75E-05	1.76E-05	3.01E-04	4.17E-05	4.85E-04	1.34E-03
Pu-238	5.22E-05	4.47E-03	9.46E-03	6.04E-03	1.04E-01	1.43E-02	1.67E-01	4.60E-01
Pu-239	3.13E-03	2.68E-01	5.66E-01	3.62E-01	6.20E+00	8.59E-01	9.98E+00	4.04E+01
Pu-240	9.57E-06	8.19E-04	1.73E-03	1.11E-03	1.90E-02	2.63E-03	3.06E-02	8.42E-02
Pu-241	3.29E-05	2.82E-03	5.96E-03	3.81E-03	6.53E-02	9.05E-03	1.05E-01	2.90E-01
Pu-242	2.63E-09	2.25E-07	4.77E-07	3.04E-07	5.22E-06	7.23E-07	8.41E-06	2.32E-05
Pu-244	1.74E-18	1.49E-16	3.15E-16	2.01E-16	3.45E-15	4.78E-16	5.56E-15	1.53E-14
Am-241	4.12E-06	3.53E-04	7.47E-04	4.77E-04	8.17E-03	1.13E-03	1.32E-02	3.63E-02
Am-243	4.46E-10	3.82E-08	8.07E-08	5.16E-08	8.84E-07	1.22E-07	1.42E-06	3.93E-06
Cm-243	1.27E-10	1.09E-08	2.30E-08	1.47E-08	2.52E-07	3.49E-08	4.05E-07	1.12E-06
Cm-244	2.01E-09	1.72E-07	3.65E-07	2.33E-07	3.99E-06	5.53E-07	6.43E-06	1.77E-05
Cm-245	1.98E-13	1.69E-11	3.58E-11	2.29E-11	3.92E-10	5.43E-11	6.31E-10	1.74E-09
Cm-246	1.85E-15	1.58E-13	3.35E-13	2.14E-13	3.66E-12	5.08E-13	5.90E-12	1.63E-11
Cm-247	4.16E-21	3.56E-19	7.53E-19	4.81E-19	8.25E-18	1.14E-18	1.33E-17	3.66E-17
Cm-248	1.55E-21	1.32E-19	2.80E-19	1.79E-19	3.07E-18	4.25E-19	4.94E-18	1.36E-17
Totals =	3.32E-01	2.85E+01	6.02E+01	3.84E+01	6.59E+02	9.17E+01	1.06E+03	2.94E+03

Table B-32 (Part 2). Lower-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)
H-3	6.34E+00	2.82E+00	9.60E-01	2.32E+00	1.26E+00	1.06E+00	2.48E-01	6.58E-01
C-14	4.32E-03	1.92E-03	6.54E-04	1.58E-03	8.62E-04	7.20E-04	1.69E-04	4.48E-04
Cl-36	2.67E-07	1.19E-07	4.04E-08	9.77E-08	5.32E-08	4.44E-08	1.04E-08	2.76E-08
Co-60	1.24E+01	5.51E+00	1.87E+00	4.54E+00	2.47E+00	2.06E+00	4.85E-01	1.28E+00
Ni-59	6.47E-03	2.88E-03	9.80E-04	2.37E-03	1.29E-03	1.08E-03	2.54E-04	6.71E-04
Ni-63	1.25E+00	5.56E-01	1.89E-01	4.58E-01	2.49E-01	2.08E-01	4.89E-02	1.29E-01
Sr-90	2.34E+03	1.04E+03	3.54E+02	8.56E+02	4.66E+02	3.89E+02	9.15E+01	2.42E+02
Nb-94	1.19E-03	5.29E-04	1.80E-04	4.36E-04	2.37E-04	1.98E-04	4.65E-05	1.23E-04
Tc-99	3.95E-01	1.76E-01	5.98E-02	1.45E-01	7.88E-02	6.58E-02	1.55E-02	4.10E-02
I-129	8.15E-04	3.63E-04	1.23E-04	2.99E-04	1.63E-04	1.36E-04	3.19E-05	8.46E-05
Cs-137	3.23E+03	1.44E+03	4.89E+02	1.18E+03	6.45E+02	5.39E+02	1.27E+02	3.35E+02
Eu-152	6.57E-02	2.92E-02	9.94E-03	2.41E-02	1.31E-02	1.09E-02	2.57E-03	6.81E-03
Eu-154	6.85E+00	3.05E+00	1.04E+00	2.51E+00	1.37E+00	1.14E+00	2.68E-01	7.10E-01
Pb-210	7.44E-10	3.31E-10	1.13E-10	2.73E-10	1.48E-10	1.24E-10	2.91E-11	7.72E-11
Ra-226	5.61E-09	3.09E-09	1.44E-09	3.10E-09	2.75E-09	1.24E-09	3.43E-10	2.14E-08
Ra-228	1.43E-13	8.13E-14	3.92E-14	8.36E-14	7.75E-14	3.28E-14	9.27E-15	3.85E-14
Ac-227	1.15E-07	5.11E-08	1.74E-08	4.20E-08	2.29E-08	1.91E-08	4.49E-09	1.19E-08
Th-228	1.35E-05	6.01E-06	2.04E-06	4.95E-06	2.69E-06	2.25E-06	5.28E-07	1.40E-06
Th-229	2.70E-08	1.20E-08	4.08E-09	9.89E-09	5.38E-09	4.49E-09	1.06E-09	2.80E-09
Th-230	1.59E-05	7.10E-06	2.41E-06	5.84E-06	3.18E-06	2.66E-06	6.24E-07	1.65E-06
Th-232	1.14E-04	1.49E-05	5.08E-06	1.23E-05	6.69E-06	5.59E-06	1.31E-06	3.48E-06
Pa-231	2.15E-06	9.59E-07	3.26E-07	7.90E-07	4.30E-07	3.59E-07	8.43E-08	2.23E-07
U-232	3.69E-04	1.64E-04	5.58E-05	1.35E-04	7.36E-05	6.15E-05	1.44E-05	3.82E-05
U-233	2.99E-05	1.33E-05	4.53E-06	1.10E-05	5.96E-06	4.98E-06	1.17E-06	3.10E-06
U-234	2.27E-01	1.39E-01	4.17E-02	1.11E-01	4.72E-02	3.25E-02	7.64E-03	2.02E-02
U-235	1.59E-02	8.84E-03	2.75E-03	7.10E-03	3.27E-03	2.41E-03	5.67E-04	1.50E-03
U-236	1.26E-02	5.59E-03	1.90E-03	4.61E-03	2.51E-03	2.09E-03	4.92E-04	1.30E-03
U-238	6.12E-03	1.86E-01	4.24E-02	8.38E-04	2.97E-02	2.55E-04	5.98E-05	1.58E-04
Np-237	2.60E-03	1.16E-03	3.94E-04	9.53E-04	5.19E-04	4.33E-04	1.02E-04	2.70E-04
Pu-238	8.94E-01	3.98E-01	1.35E-01	3.28E-01	1.78E-01	1.49E-01	3.50E-02	9.28E-02
Pu-239	7.51E+01	2.38E+01	8.10E+00	1.96E+01	1.07E+01	8.92E+00	2.10E+00	5.55E+00
Pu-240	1.64E-01	7.30E-02	2.48E-02	6.01E-02	3.27E-02	2.73E-02	6.42E-03	1.70E-02
Pu-241	5.64E-01	2.51E-01	8.54E-02	2.07E-01	1.12E-01	9.40E-02	2.21E-02	5.85E-02
Pu-242	4.51E-05	2.01E-05	6.82E-06	1.65E-05	8.99E-06	7.51E-06	1.77E-06	4.67E-06
Pu-244	2.98E-14	1.33E-14	4.51E-15	1.09E-14	5.95E-15	4.97E-15	1.17E-15	3.09E-15
Am-241	7.06E-02	3.14E-02	1.07E-02	2.59E-02	1.41E-02	1.18E-02	2.77E-03	7.32E-03
Am-243	7.63E-06	3.40E-06	1.16E-06	2.80E-06	1.52E-06	1.27E-06	2.99E-07	7.92E-07
Cm-243	2.17E-06	9.68E-07	3.29E-07	7.97E-07	4.34E-07	3.62E-07	8.51E-08	2.25E-07
Cm-244	3.45E-05	1.54E-05	5.22E-06	1.26E-05	6.88E-06	5.75E-06	1.35E-06	3.58E-06
Cm-245	3.39E-09	1.51E-09	5.13E-10	1.24E-09	6.75E-10	5.64E-10	1.33E-10	3.51E-10
Cm-246	3.17E-11	1.41E-11	4.79E-12	1.16E-11	6.31E-12	5.28E-12	1.24E-12	3.28E-12
Cm-247	7.12E-17	3.17E-17	1.08E-17	2.61E-17	1.42E-17	1.19E-17	2.79E-18	7.39E-18
Cm-248	2.65E-17	1.18E-17	4.01E-18	9.71E-18	5.28E-18	4.41E-18	1.04E-18	2.75E-18
Totals =	5.71E+03	2.53E+03	8.62E+02	2.09E+03	1.14E+03	9.48E+02	2.23E+02	5.90E+02

Table B-32 (Part 3). Lower-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)
H-3	5.87E-01	3.50E-01	2.36E-01	7.09E-02	7.94E-02	8.40E-01	1.50E-01	8.41E+00
C-14	4.00E-04	1.62E+00	1.19E+00	1.96E+00	1.25E+00	6.18E-01	8.21E-01	5.69E-01
Cl-36	2.47E-08	3.93E-04	3.02E-04	3.56E-04	2.68E-04	2.53E-04	2.31E-04	2.25E-04
Co-60	1.15E+00	8.29E+04	6.09E+04	9.82E+04	5.84E+04	3.07E+04	4.24E+04	3.07E+04
Ni-59	5.99E-04	8.38E+00	6.26E+00	1.11E+01	7.46E+00	2.78E+00	4.11E+00	2.79E+00
Ni-63	1.16E-01	6.15E+02	4.62E+02	8.15E+02	5.36E+02	2.01E+02	3.02E+02	2.04E+02
Sr-90	2.16E+02	1.29E+02	8.71E+01	2.32E+01	2.92E+01	3.93E+01	8.58E+00	1.52E+02
Nb-94	1.10E-04	2.76E-01	2.07E-01	3.70E-01	2.44E-01	8.62E-02	1.34E-01	8.95E-02
Tc-99	3.66E-02	6.99E-01	5.23E-01	9.01E-01	5.89E-01	2.24E-01	3.34E-01	2.50E-01
I-129	7.55E-05	4.50E-05	3.04E-05	8.09E-06	1.02E-05	1.37E-05	2.99E-06	5.30E-05
Cs-137	2.99E+02	1.78E+02	1.20E+02	3.20E+01	4.04E+01	5.43E+01	1.19E+01	2.10E+02
Eu-152	6.08E-03	3.62E-03	2.45E-03	6.51E-04	8.22E-04	1.10E-03	2.41E-04	4.27E-03
Eu-154	6.34E-01	3.78E-01	2.55E-01	6.79E-02	8.57E-02	1.15E-01	2.51E-02	4.46E-01
Pb-210	6.89E-11	4.10E-11	2.78E-11	7.38E-12	9.32E-12	1.25E-11	2.73E-12	4.84E-11
Ra-226	1.33E-01	6.40E-10	3.16E-10	7.01E-11	1.36E-10	6.67E-07	1.27E-11	5.67E-10
Ra-228	3.01E-14	1.78E-14	8.53E-15	1.85E-15	3.75E-15	5.42E-15	2.87E-16	1.53E-14
Ac-227	1.06E-08	6.32E-09	4.28E-09	1.14E-09	1.44E-09	1.93E-09	4.21E-10	7.46E-09
Th-228	1.25E-06	7.44E-07	5.03E-07	1.34E-07	1.69E-07	2.27E-07	4.95E-08	8.77E-07
Th-229	2.50E-09	1.49E-09	1.01E-09	2.67E-10	3.38E-10	4.54E-10	9.90E-11	1.75E-09
Th-230	1.48E-06	8.79E-07	5.94E-07	1.58E-07	2.00E-07	2.68E-07	5.85E-08	1.04E-06
Th-232	3.10E-06	1.85E-06	1.25E-06	3.33E-07	4.20E-07	5.64E-07	1.23E-07	2.18E-06
Pa-231	1.99E-07	1.19E-07	8.03E-08	2.14E-08	2.70E-08	3.62E-08	7.91E-09	1.40E-07
U-232	3.41E-05	2.03E-05	1.38E-05	3.66E-06	4.62E-06	6.20E-06	1.35E-06	2.40E-05
U-233	2.77E-06	1.65E-06	1.11E-06	2.97E-07	3.74E-07	5.03E-07	1.10E-07	1.94E-06
U-234	4.66E-02	1.63E-02	2.41E-02	3.18E-02	4.17E-03	3.28E-03	1.13E-02	2.15E-02
U-235	2.64E-03	1.05E-03	1.31E-03	1.51E-03	2.60E-04	2.43E-04	5.37E-04	1.34E-03
U-236	1.16E-03	6.93E-04	4.68E-04	1.25E-04	1.57E-04	2.11E-04	4.61E-05	8.17E-04
U-238	1.01E-01	1.98E-02	5.96E-02	1.05E-01	6.13E-03	2.57E-05	3.73E-02	3.11E-02
Np-237	2.41E-04	1.43E-04	9.69E-05	2.58E-05	3.25E-05	2.95E-03	9.54E-06	1.69E-04
Pu-238	8.28E-02	4.93E-02	3.34E-02	8.87E-03	1.12E-02	1.50E-02	3.28E-03	5.82E-02
Pu-239	4.95E+00	2.95E+00	2.00E+00	5.31E-01	6.70E-01	9.00E-01	1.97E-01	3.48E+00
Pu-240	1.52E-02	9.04E-03	6.11E-03	1.63E-03	2.05E-03	2.76E-03	6.02E-04	1.07E-02
Pu-241	5.22E-02	3.11E-02	2.10E-02	5.59E-03	7.06E-03	9.48E-03	2.07E-03	3.67E-02
Pu-242	4.17E-06	2.49E-06	1.68E-06	4.47E-07	5.64E-07	7.58E-07	1.65E-07	2.93E-06
Pu-244	2.76E-15	1.64E-15	1.11E-15	2.96E-16	3.73E-16	5.01E-16	1.09E-16	1.94E-15
Am-241	6.53E-03	3.89E-03	2.63E-03	7.00E-04	8.84E-04	1.19E-03	2.59E-04	4.59E-03
Am-243	7.07E-07	4.21E-07	2.85E-07	7.57E-08	9.56E-08	1.28E-07	2.80E-08	4.97E-07
Cm-243	2.01E-07	1.20E-07	8.11E-08	2.16E-08	2.72E-08	3.66E-08	7.98E-09	1.41E-07
Cm-244	3.19E-06	1.90E-06	1.29E-06	3.42E-07	4.32E-07	5.80E-07	1.27E-07	2.24E-06
Cm-245	3.13E-10	1.87E-10	1.26E-10	3.36E-11	4.24E-11	5.69E-11	1.24E-11	2.20E-10
Cm-246	2.93E-12	1.75E-12	1.18E-12	3.14E-13	3.96E-13	5.32E-13	1.16E-13	2.06E-12
Cm-247	6.59E-18	3.93E-18	2.66E-18	7.07E-19	8.92E-19	1.20E-18	2.62E-19	4.63E-18
Cm-248	2.45E-18	1.46E-18	9.87E-19	2.63E-19	3.31E-19	4.45E-19	9.72E-20	1.72E-18
Totals =	5.27E+02	8.38E+04	6.16E+04	9.91E+04	5.91E+04	3.10E+04	4.27E+04	3.13E+04

Table B-32 (Part 4). Lower-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)
H-3	1.60E-01	5.84E-02	8.38E-02	1.20E-01	3.82E+00	1.80E-02	1.25E-03	5.64E-04
C-14	7.73E-01	9.17E-01	8.34E-01	1.29E+00	6.16E-01	1.05E+00	8.17E-01	5.07E-01
Cl-36	2.31E-04	2.00E-04	2.19E-04	2.98E-04	1.98E-04	1.59E-04	2.51E-04	1.18E-04
Co-60	3.48E+04	4.55E+04	4.00E+04	6.39E+04	3.15E+04	5.01E+04	3.86E+04	2.43E+04
Ni-59	3.49E+00	4.97E+00	4.13E+00	6.55E+00	3.24E+00	6.03E+00	4.08E+00	2.90E+00
Ni-63	2.50E+02	3.63E+02	3.01E+02	4.80E+02	2.37E+02	4.38E+02	2.95E+02	2.11E+02
Sr-90	5.88E+01	2.15E+01	3.09E+01	4.42E+01	1.41E+03	6.63E+00	4.61E-01	2.08E-01
Nb-94	1.09E-01	1.63E-01	1.34E-01	2.14E-01	1.06E-01	2.00E-01	1.31E-01	9.51E-02
Tc-99	2.78E-01	4.01E-01	3.33E-01	5.33E-01	4.97E-01	4.80E-01	3.20E-01	2.30E-01
I-129	2.05E-05	7.50E-06	1.08E-05	1.54E-05	4.92E-04	2.31E-06	1.61E-07	7.25E-08
Cs-137	8.13E+01	2.97E+01	4.27E+01	6.12E+01	1.95E+03	9.16E+00	6.38E-01	2.87E-01
Eu-152	1.65E-03	6.04E-04	8.68E-04	1.24E-03	3.96E-02	1.86E-04	1.30E-05	5.84E-06
Eu-154	1.72E-01	6.30E-02	9.05E-02	1.30E-01	4.13E+00	1.94E-02	1.35E-03	6.09E-04
Pb-210	1.87E-11	6.85E-12	9.84E-12	1.41E-11	4.49E-10	2.11E-12	1.47E-13	6.62E-14
Ra-226	8.74E-11	4.30E-11	8.21E-11	2.35E-10	8.34E-09	9.85E-12	6.86E-13	3.09E-13
Ra-228	1.97E-15	1.05E-15	2.12E-15	6.57E-15	2.35E-13	2.22E-16	1.54E-17	6.96E-18
Ac-227	2.89E-09	1.06E-09	1.52E-09	2.17E-09	6.91E-08	3.25E-10	2.27E-11	1.02E-11
Th-228	3.39E-07	1.24E-07	1.78E-07	2.55E-07	8.13E-06	3.83E-08	2.66E-09	1.20E-09
Th-229	6.79E-10	2.48E-10	3.56E-10	5.10E-10	1.63E-08	7.65E-11	5.33E-12	2.40E-12
Th-230	4.01E-07	1.47E-07	2.11E-07	3.02E-07	9.61E-06	4.52E-08	3.15E-09	1.42E-09
Th-232	8.44E-07	3.09E-07	4.43E-07	6.35E-07	2.02E-05	9.51E-08	6.62E-09	2.98E-09
Pa-231	5.42E-08	1.98E-08	2.85E-08	4.08E-08	1.30E-06	6.11E-09	4.25E-10	1.92E-10
U-232	9.28E-06	3.39E-06	4.87E-06	6.98E-06	2.22E-04	1.05E-06	7.28E-08	3.28E-08
U-233	7.52E-07	2.75E-07	3.95E-07	5.66E-07	1.80E-05	8.48E-08	5.91E-09	2.66E-09
U-234	3.34E-02	8.01E-03	4.61E-02	1.89E-01	3.77E-01	7.71E-02	1.06E-02	3.88E-03
U-235	1.66E-03	4.15E-04	2.16E-03	8.69E-03	2.05E-02	3.51E-03	4.79E-04	1.76E-04
U-236	3.16E-04	1.16E-04	1.66E-04	2.38E-04	7.57E-03	3.56E-05	2.48E-06	1.12E-06
U-238	2.33E-02	8.72E-05	2.81E-03	2.14E-02	4.94E-03	2.14E-03	3.57E-05	7.81E-05
Np-237	6.54E-05	2.39E-05	3.44E-05	4.92E-05	1.57E-03	7.37E-06	5.14E-07	2.31E-07
Pu-238	2.25E-02	8.23E-03	1.18E-02	1.69E-02	5.39E-01	2.54E-03	1.77E-04	7.96E-05
Pu-239	1.35E+00	4.93E-01	7.07E-01	1.01E+00	3.23E+01	1.52E-01	1.06E-02	4.76E-03
Pu-240	4.12E-03	1.51E-03	2.17E-03	3.10E-03	9.88E-02	4.65E-04	3.24E-05	1.46E-05
Pu-241	1.42E-02	5.19E-03	7.45E-03	1.07E-02	3.40E-01	1.60E-03	1.11E-04	5.02E-05
Pu-242	1.13E-06	4.15E-07	5.96E-07	8.53E-07	2.72E-05	1.28E-07	8.90E-09	4.01E-09
Pu-244	7.50E-16	2.74E-16	3.94E-16	5.64E-16	1.80E-14	8.45E-17	5.89E-18	2.65E-18
Am-241	1.78E-03	6.50E-04	9.33E-04	1.34E-03	4.26E-02	2.00E-04	1.39E-05	6.28E-06
Am-243	1.92E-07	7.03E-08	1.01E-07	1.44E-07	4.60E-06	2.17E-08	1.51E-09	6.79E-10
Cm-243	5.47E-08	2.00E-08	2.87E-08	4.11E-08	1.31E-06	6.17E-09	4.30E-10	1.93E-10
Cm-244	8.68E-07	3.17E-07	4.56E-07	6.53E-07	2.08E-05	9.78E-08	6.81E-09	3.07E-09
Cm-245	8.52E-11	3.12E-11	4.48E-11	6.41E-11	2.04E-09	9.60E-12	6.69E-13	3.01E-13
Cm-246	7.97E-13	2.91E-13	4.18E-13	5.99E-13	1.91E-11	8.98E-14	6.25E-15	2.82E-15
Cm-247	1.79E-18	6.56E-19	9.42E-19	1.35E-18	4.30E-17	2.02E-19	1.41E-20	6.34E-21
Cm-248	6.66E-19	2.44E-19	3.50E-19	5.01E-19	1.60E-17	7.51E-20	5.23E-21	2.36E-21
Totals =	3.52E+04	4.59E+04	4.04E+04	6.45E+04	3.52E+04	5.06E+04	3.89E+04	2.46E+04

Table B-32 (Part 5). Lower-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	Total		
	1992 (Ci)	1993 (Ci)	1960–1993 (Ci)
H-3	2.12E-02	6.10E-04	3.61E+01
C-14	4.56E-01	4.23E-01	1.57E+01
Cl-36	1.18E-04	1.16E-04	3.94E-03
Co-60	1.96E+04	1.89E+04	7.72E+05
Ni-59	2.10E+00	1.96E+00	8.23E+01
Ni-63	1.50E+02	1.41E+02	6.01E+03
Sr-90	7.83E+00	2.25E-01	1.00E+04
Nb-94	6.58E-02	6.16E-02	2.69E+00
Tc-99	1.62E-01	1.52E-01	8.26E+00
I-129	2.73E-06	7.85E-08	3.50E-03
Cs-137	1.08E+01	3.11E-01	1.39E+04
Eu-152	2.20E-04	6.32E-06	2.82E-01
Eu-154	2.30E-02	6.59E-04	2.94E+01
Pb-210	2.49E-12	7.16E-14	3.20E-09
Ra-226	1.16E-11	3.34E-13	1.33E-01
Ra-228	2.62E-16	7.52E-18	9.69E-13
Ac-227	3.84E-10	1.10E-11	4.93E-07
Th-228	4.52E-08	1.30E-09	5.79E-05
Th-229	9.03E-11	2.59E-12	1.16E-07
Th-230	5.34E-08	1.53E-09	6.85E-05
Th-232	1.12E-07	3.23E-09	3.05E-04
Pa-231	7.22E-09	2.07E-10	9.25E-06
U-232	1.24E-06	3.55E-08	1.58E-03
U-233	1.00E-07	2.88E-09	1.28E-04
U-234	1.29E-02	2.05E-02	1.98E+00
U-235	6.04E-04	9.29E-04	1.14E-01
U-236	4.21E-05	1.21E-06	5.40E-02
U-238	2.54E-03	4.92E-05	9.23E-01
Np-237	8.71E-06	2.50E-07	1.41E-02
Pu-238	3.00E-03	8.61E-05	3.84E+00
Pu-239	1.79E-01	5.15E-03	2.64E+02
Pu-240	5.49E-04	1.58E-05	7.04E-01
Pu-241	1.89E-03	5.42E-05	2.42E+00
Pu-242	1.51E-07	4.34E-09	1.94E-04
Pu-244	9.99E-17	2.87E-18	1.28E-13
Am-241	2.37E-04	6.79E-06	3.03E-01
Am-243	2.56E-08	7.35E-10	3.28E-05
Cm-243	7.29E-09	2.09E-10	9.34E-06
Cm-244	1.16E-07	3.32E-09	1.48E-04
Cm-245	1.13E-11	3.26E-13	1.45E-08
Cm-246	1.06E-13	3.05E-15	1.36E-10
Cm-247	2.39E-19	6.86E-21	3.06E-16
Cm-248	8.87E-20	2.55E-21	1.14E-16
Totals =	1.98E+04	1.91E+04	8.02E+05

File = "NEW Lower-bound Totals.xls"

Table B-33. Upper-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1960 (Ci)	1961 (Ci)	1962 (Ci)	1963 (Ci)	1964 (Ci)	1965 (Ci)	1966 (Ci)	1967 (Ci)
H-3	9.26E-03	7.93E-01	1.68E+00	1.07E+00	1.84E+01	2.54E+00	2.96E+01	8.15E+01
C-14	6.31E-06	5.40E-04	1.14E-03	7.29E-04	1.25E-02	1.73E-03	2.01E-02	5.55E-02
Cl-36	1.56E-07	1.33E-05	2.82E-05	1.80E-05	3.09E-04	4.28E-05	4.97E-04	1.37E-03
Co-60	7.23E-02	6.19E+00	1.31E+01	8.36E+00	1.43E+02	1.99E+01	2.31E+02	6.36E+02
Ni-59	3.78E-05	3.24E-03	6.85E-03	4.37E-03	7.50E-02	1.04E-02	1.21E-01	3.33E-01
Ni-63	2.92E-04	2.50E-02	5.28E-02	3.37E-02	5.78E-01	8.01E-02	9.31E-01	2.57E+00
Sr-90	5.46E-01	4.67E+01	9.88E+01	6.31E+01	1.08E+03	1.50E+02	1.74E+03	4.80E+03
Nb-94	6.24E-07	5.35E-05	1.13E-04	7.22E-05	1.24E-03	1.72E-04	1.99E-03	5.50E-03
Tc-99	9.23E-05	7.90E-03	1.67E-02	1.07E-02	1.83E-01	2.54E-02	2.95E-01	8.12E-01
I-129	1.91E-07	1.63E-05	3.45E-05	2.20E-05	3.78E-04	5.23E-05	6.08E-04	1.68E-03
Cs-137	7.55E-01	6.46E+01	1.37E+02	8.73E+01	1.50E+03	2.07E+02	2.41E+03	6.64E+03
Eu-152	9.59E-05	8.21E-03	1.74E-02	1.11E-02	1.90E-01	2.63E-02	3.06E-01	8.44E-01
Eu-154	1.00E-02	8.56E-01	1.81E+00	1.16E+00	1.98E+01	2.75E+00	3.19E+01	8.80E+01
Pb-210	4.35E-12	3.72E-10	7.87E-10	5.03E-10	8.62E-09	1.19E-09	1.39E-08	3.83E-08
Ra-226	8.07E-11	4.56E-09	1.46E-08	2.47E-09	5.42E-08	2.11E-08	2.42E-07	6.22E-07
Ra-228	4.54E-14	2.48E-12	8.25E-12	1.13E-12	2.65E-11	1.19E-11	1.36E-10	3.47E-10
Ac-227	2.68E-09	2.29E-07	4.85E-07	3.10E-07	5.31E-06	7.36E-07	8.55E-06	2.36E-05
Th-228	1.97E-06	1.69E-04	3.57E-04	2.28E-04	3.90E-03	5.41E-04	6.29E-03	1.73E-02
Th-229	1.42E-11	1.21E-09	2.57E-09	1.64E-09	2.81E-08	3.89E-09	4.53E-08	1.25E-07
Th-230	3.72E-09	3.19E-07	6.74E-07	4.31E-07	7.38E-06	1.02E-06	1.19E-05	3.28E-05
Th-232	4.90E-08	4.19E-06	8.86E-06	5.66E-06	9.71E-05	1.34E-05	1.56E-04	6.12E-04
Pa-231	3.14E-09	2.69E-07	5.69E-07	3.64E-07	6.23E-06	8.64E-07	1.00E-05	2.77E-05
U-232	8.62E-08	7.38E-06	1.56E-05	9.96E-06	1.71E-04	2.37E-05	2.75E-04	7.58E-04
U-233	6.98E-09	5.98E-07	1.26E-06	8.08E-07	1.38E-05	1.92E-06	2.23E-05	6.15E-05
U-234	4.56E-05	3.90E-03	8.25E-03	5.27E-03	1.06E-01	4.61E-01	1.45E-01	5.06E-01
U-235	1.02E-06	8.75E-05	1.85E-04	1.18E-04	2.74E-03	2.08E-02	3.26E-03	1.38E-02
U-236	2.93E-06	2.51E-04	5.31E-04	3.39E-04	5.82E-03	8.06E-04	9.37E-03	2.58E-02
U-238	3.57E-07	3.06E-05	6.46E-05	4.13E-05	1.64E-02	4.50E-01	1.14E-03	7.58E-02
Np-237	6.07E-07	5.20E-05	1.10E-04	7.02E-05	1.20E-03	1.67E-04	1.94E-03	5.35E-03
Pu-238	4.70E-04	4.03E-02	8.51E-02	5.44E-02	9.32E-01	1.29E-01	1.50E+00	4.14E+00
Pu-239	1.25E-02	1.07E+00	2.26E+00	1.45E+00	2.48E+01	3.44E+00	3.99E+01	1.39E+02
Pu-240	9.57E-04	8.19E-02	1.73E-01	1.11E-01	1.90E+00	2.63E-01	3.06E+00	8.42E+00
Pu-241	8.23E-02	7.05E+00	1.49E+01	9.52E+00	1.63E+02	2.26E+01	2.63E+02	7.25E+02
Pu-242	2.63E-07	2.25E-05	4.77E-05	3.04E-05	5.22E-04	7.23E-05	8.41E-04	2.32E-03
Pu-244	1.74E-16	1.49E-14	3.15E-14	2.01E-14	3.45E-13	4.78E-14	5.56E-13	1.53E-12
Am-241	4.12E-04	3.53E-02	7.47E-02	4.77E-02	8.17E-01	1.13E-01	1.32E+00	3.63E+00
Am-243	1.11E-06	9.54E-05	2.02E-04	1.29E-04	2.21E-03	3.06E-04	3.56E-03	9.81E-03
Cm-243	3.17E-07	2.72E-05	5.75E-05	3.67E-05	6.29E-04	8.72E-05	1.01E-03	2.79E-03
Cm-244	2.01E-05	1.72E-03	3.65E-03	2.33E-03	3.99E-02	5.53E-03	6.43E-02	1.77E-01
Cm-245	4.94E-10	4.23E-08	8.95E-08	5.72E-08	9.80E-07	1.36E-07	1.58E-06	4.35E-06
Cm-246	4.62E-12	3.96E-10	8.37E-10	5.35E-10	9.16E-09	1.27E-09	1.48E-08	4.07E-08
Cm-247	1.66E-18	1.43E-16	3.01E-16	1.93E-16	3.30E-15	4.57E-16	5.31E-15	1.47E-14
Cm-248	1.55E-19	1.32E-17	2.80E-17	1.79E-17	3.07E-16	4.25E-17	4.94E-16	1.36E-15
Totals =	1.49E+00	1.28E+02	2.71E+02	1.73E+02	2.96E+03	4.11E+02	4.77E+03	1.32E+04

Table B-33 (Part 2). Upper-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1968 (Ci)	1969 (Ci)	1970 (Ci)	1971 (Ci)	1972 (Ci)	1973 (Ci)	1974 (Ci)	1975 (Ci)
H-3	1.59E+02	7.06E+01	2.40E+01	5.81E+01	3.16E+01	2.64E+01	6.21E+00	1.64E+01
C-14	1.08E-01	4.81E-02	1.63E-02	3.96E-02	2.15E-02	1.80E-02	4.23E-03	1.12E-02
Cl-36	2.67E-03	1.19E-03	4.04E-04	9.77E-04	5.32E-04	4.44E-04	1.04E-04	2.76E-04
Co-60	1.24E+03	5.51E+02	1.87E+02	4.54E+02	2.47E+02	2.06E+02	4.85E+01	1.28E+02
Ni-59	6.47E-01	2.88E-01	9.80E-02	2.37E-01	1.29E-01	1.08E-01	2.54E-02	6.71E-02
Ni-63	4.99E+00	2.22E+00	7.56E-01	1.83E+00	9.96E-01	8.32E-01	1.96E-01	5.18E-01
Sr-90	9.34E+03	4.16E+03	1.41E+03	3.43E+03	1.86E+03	1.56E+03	3.66E+02	9.69E+02
Nb-94	1.07E-02	4.76E-03	1.62E-03	3.92E-03	2.13E-03	1.78E-03	4.19E-04	1.11E-03
Tc-99	1.58E+00	7.03E-01	2.39E-01	5.79E-01	3.15E-01	2.63E-01	6.19E-02	1.64E-01
I-129	3.26E-03	1.45E-03	4.94E-04	1.20E-03	6.51E-04	5.44E-04	1.28E-04	3.38E-04
Cs-137	1.29E+04	5.75E+03	1.96E+03	4.74E+03	2.58E+03	2.15E+03	5.06E+02	1.34E+03
Eu-152	1.64E+00	7.31E-01	2.49E-01	6.02E-01	3.27E-01	2.74E-01	6.43E-02	1.70E-01
Eu-154	1.71E+02	7.62E+01	2.59E+01	6.28E+01	3.42E+01	2.85E+01	6.71E+00	1.78E+01
Pb-210	7.44E-08	3.31E-08	1.13E-08	2.73E-08	1.48E-08	1.24E-08	2.91E-09	7.72E-09
Ra-226	1.17E-06	4.63E-07	1.19E-07	3.26E-07	7.10E-08	1.66E-07	3.37E-08	8.79E-08
Ra-228	6.53E-10	2.55E-10	6.37E-11	1.77E-10	3.23E-11	9.09E-11	1.82E-11	2.04E-11
Ac-227	4.59E-05	2.04E-05	6.94E-06	1.68E-05	9.15E-06	7.64E-06	1.80E-06	4.76E-06
Th-228	3.37E-02	1.50E-02	5.11E-03	1.24E-02	6.73E-03	5.62E-03	1.32E-03	3.50E-03
Th-229	2.43E-07	1.08E-07	3.67E-08	8.90E-08	4.84E-08	4.04E-08	9.50E-09	2.52E-08
Th-230	6.38E-05	2.84E-05	9.65E-06	2.34E-05	1.27E-05	1.06E-05	2.50E-06	6.61E-06
Th-232	1.02E-03	3.73E-04	1.27E-04	3.07E-04	1.67E-04	1.40E-04	3.28E-05	8.69E-05
Pa-231	5.38E-05	2.40E-05	8.15E-06	1.97E-05	1.07E-05	8.97E-06	2.11E-06	5.58E-06
U-232	1.47E-03	6.57E-04	2.23E-04	5.41E-04	2.94E-04	2.46E-04	5.78E-05	1.53E-04
U-233	1.20E-04	5.32E-05	1.81E-05	4.38E-05	2.39E-05	1.99E-05	4.68E-06	1.24E-05
U-234	8.52E-01	4.65E-01	1.45E-01	3.74E-01	1.74E-01	1.30E-01	3.05E-02	8.09E-02
U-235	2.08E-02	1.32E-02	3.90E-03	1.05E-02	4.35E-03	2.92E-03	6.85E-04	1.82E-03
U-236	5.02E-02	2.24E-02	7.61E-03	1.84E-02	1.00E-02	8.37E-03	1.97E-03	5.21E-03
U-238	1.64E-02	4.19E-01	9.57E-02	2.87E-03	6.74E-02	1.02E-03	2.39E-04	6.34E-04
Np-237	1.04E-02	4.63E-03	1.57E-03	3.81E-03	2.07E-03	1.73E-03	4.07E-04	1.08E-03
Pu-238	8.05E+00	3.58E+00	1.22E+00	2.95E+00	1.61E+00	1.34E+00	3.15E-01	8.35E-01
Pu-239	2.63E+02	9.53E+01	3.24E+01	7.85E+01	4.27E+01	3.57E+01	8.38E+00	2.22E+01
Pu-240	1.64E+01	7.30E+00	2.48E+00	6.01E+00	3.27E+00	2.73E+00	6.42E-01	1.70E+00
Pu-241	1.41E+03	6.28E+02	2.13E+02	5.17E+02	2.81E+02	2.35E+02	5.52E+01	1.46E+02
Pu-242	4.51E-03	2.01E-03	6.82E-04	1.65E-03	8.99E-04	7.51E-04	1.77E-04	4.67E-04
Pu-244	2.98E-12	1.33E-12	4.51E-13	1.09E-12	5.95E-13	4.97E-13	1.17E-13	3.09E-13
Am-241	7.06E+00	3.14E+00	1.07E+00	2.59E+00	1.41E+00	1.18E+00	2.77E-01	7.32E-01
Am-243	1.91E-02	8.50E-03	2.89E-03	7.00E-03	3.81E-03	3.18E-03	7.47E-04	1.98E-03
Cm-243	5.44E-03	2.42E-03	8.23E-04	1.99E-03	1.08E-03	9.06E-04	2.13E-04	5.64E-04
Cm-244	3.45E-01	1.54E-01	5.22E-02	1.26E-01	6.88E-02	5.75E-02	1.35E-02	3.58E-02
Cm-245	8.46E-06	3.77E-06	1.28E-06	3.10E-06	1.69E-06	1.41E-06	3.31E-07	8.78E-07
Cm-246	7.91E-08	3.52E-08	1.20E-08	2.90E-08	1.58E-08	1.32E-08	3.10E-09	8.21E-09
Cm-247	2.85E-14	1.27E-14	4.32E-15	1.04E-14	5.69E-15	4.75E-15	1.12E-15	2.96E-15
Cm-248	2.65E-15	1.18E-15	4.01E-16	9.71E-16	5.28E-16	4.41E-16	1.04E-16	2.75E-16
Totals =	2.56E+04	1.14E+04	3.87E+03	9.38E+03	5.10E+03	4.26E+03	1.00E+03	2.65E+03

Table B-33 (Part 3). Upper-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1976 (Ci)	1977 (Ci)	1978 (Ci)	1979 (Ci)	1980 (Ci)	1981 (Ci)	1982 (Ci)	1983 (Ci)
H-3	1.47E+01	8.74E+00	5.91E+00	1.59E+00	1.98E+00	4.32E+00	8.67E-01	2.83E+01
C-14	9.99E-03	6.47E+00	4.77E+00	7.84E+00	4.99E+00	2.47E+00	3.28E+00	2.28E+00
Cl-36	2.47E-04	1.72E-03	1.31E-03	1.45E-03	1.10E-03	1.06E-03	9.35E-04	1.07E-03
Co-60	1.15E+02	3.32E+05	2.44E+05	3.93E+05	2.34E+05	1.23E+05	1.69E+05	1.23E+05
Ni-59	5.99E-02	3.35E+01	2.51E+01	4.43E+01	2.99E+01	1.11E+01	1.65E+01	1.12E+01
Ni-63	4.62E-01	2.46E+03	1.85E+03	3.26E+03	2.14E+03	8.03E+02	1.21E+03	8.17E+02
Sr-90	8.65E+02	5.15E+02	3.48E+02	9.27E+01	1.17E+02	1.57E+02	3.43E+01	6.08E+02
Nb-94	9.89E-04	1.10E+00	8.28E-01	1.48E+00	9.78E-01	3.45E-01	5.37E-01	3.58E-01
Tc-99	1.46E-01	2.80E+00	2.09E+00	3.60E+00	2.36E+00	8.96E-01	1.33E+00	1.00E+00
I-129	3.02E-04	1.80E-04	1.22E-04	3.23E-05	4.08E-05	5.49E-05	1.20E-05	2.12E-04
Cs-137	1.20E+03	7.13E+02	4.82E+02	1.28E+02	1.62E+02	2.17E+02	4.75E+01	8.41E+02
Eu-152	1.52E-01	9.05E-02	6.12E-02	1.63E-02	2.05E-02	2.76E-02	6.03E-03	1.07E-01
Eu-154	1.58E+01	9.44E+00	6.39E+00	1.70E+00	2.14E+00	2.88E+00	6.29E-01	1.11E+01
Pb-210	6.89E-09	4.10E-09	2.78E-09	7.38E-10	9.32E-10	1.25E-09	2.73E-10	4.84E-09
Ra-226	3.00E-01	3.17E-08	3.31E-08	1.02E-08	8.16E-09	1.51E-06	5.10E-09	5.62E-08
Ra-228	2.65E-11	1.62E-11	1.79E-11	5.61E-12	4.25E-12	4.94E-12	2.87E-12	3.04E-11
Ac-227	4.24E-06	2.53E-06	1.71E-06	4.55E-07	5.74E-07	7.71E-07	1.68E-07	2.98E-06
Th-228	3.12E-03	1.86E-03	1.26E-03	3.34E-04	4.22E-04	5.67E-04	1.24E-04	2.19E-03
Th-229	2.25E-08	1.34E-08	9.05E-09	2.41E-09	3.04E-09	4.08E-09	8.91E-10	1.58E-08
Th-230	5.90E-06	3.52E-06	2.38E-06	6.32E-07	7.98E-07	1.07E-06	2.34E-07	4.15E-06
Th-232	7.76E-05	4.62E-05	3.13E-05	8.31E-06	1.05E-05	1.41E-05	3.08E-06	5.45E-05
Pa-231	4.98E-06	2.97E-06	2.01E-06	5.34E-07	6.74E-07	9.06E-07	1.98E-07	3.50E-06
U-232	1.36E-04	8.13E-05	5.50E-05	1.46E-05	1.85E-05	2.48E-05	5.42E-06	9.59E-05
U-233	1.11E-05	6.59E-06	4.46E-06	1.19E-06	1.50E-06	2.01E-06	4.39E-07	7.78E-06
U-234	1.36E-01	5.56E-02	6.70E-02	7.49E-02	1.37E-02	1.31E-02	2.67E-02	7.05E-02
U-235	4.56E-03	1.54E-03	2.39E-03	3.25E-03	3.97E-04	2.94E-04	1.15E-03	2.04E-03
U-236	4.65E-03	2.77E-03	1.87E-03	4.98E-04	6.29E-04	8.45E-04	1.84E-04	3.27E-03
U-238	2.27E-01	4.47E-02	1.34E-01	2.37E-01	1.38E-02	1.03E-04	8.40E-02	7.01E-02
Np-237	9.62E-04	5.73E-04	3.88E-04	1.03E-04	1.30E-04	6.73E-03	3.82E-05	6.76E-04
Pu-238	7.45E-01	4.44E-01	3.00E-01	7.98E-02	1.01E-01	1.35E-01	2.96E-02	5.24E-01
Pu-239	1.98E+01	1.18E+01	7.98E+00	2.12E+00	2.68E+00	3.60E+00	7.86E-01	1.39E+01
Pu-240	1.52E+00	9.04E-01	6.11E-01	1.63E-01	2.05E-01	2.76E-01	6.02E-02	1.07E+00
Pu-241	1.30E+02	7.77E+01	5.26E+01	1.40E+01	1.76E+01	2.37E+01	5.17E+00	9.17E+01
Pu-242	4.17E-04	2.49E-04	1.68E-04	4.47E-05	5.64E-05	7.58E-05	1.65E-05	2.93E-04
Pu-244	2.76E-13	1.64E-13	1.11E-13	2.96E-14	3.73E-14	5.01E-14	1.09E-14	1.94E-13
Am-241	6.53E-01	3.89E-01	2.63E-01	7.00E-02	8.84E-02	1.19E-01	2.59E-02	4.59E-01
Am-243	1.77E-03	1.05E-03	7.12E-04	1.89E-04	2.39E-04	3.21E-04	7.01E-05	1.24E-03
Cm-243	5.03E-04	3.00E-04	2.03E-04	5.39E-05	6.80E-05	9.14E-05	2.00E-05	3.54E-04
Cm-244	3.19E-02	1.90E-02	1.29E-02	3.42E-03	4.32E-03	5.80E-03	1.27E-03	2.24E-02
Cm-245	7.83E-07	4.67E-07	3.16E-07	8.40E-08	1.06E-07	1.42E-07	3.11E-08	5.51E-07
Cm-246	7.32E-09	4.36E-09	2.95E-09	7.85E-10	9.91E-10	1.33E-09	2.91E-10	5.15E-09
Cm-247	2.64E-15	1.57E-15	1.06E-15	2.83E-16	3.57E-16	4.79E-16	1.05E-16	1.85E-15
Cm-248	2.45E-16	1.46E-16	9.87E-17	2.63E-17	3.31E-17	4.45E-17	9.72E-18	1.72E-16
Totals =	2.37E+03	3.35E+05	2.47E+05	3.97E+05	2.36E+05	1.24E+05	1.71E+05	1.25E+05

Table B-33 (Part 4). Upper-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1984 (Ci)	1985 (Ci)	1986 (Ci)	1987 (Ci)	1988 (Ci)	1989 (Ci)	1990 (Ci)	1991 (Ci)
H-3	3.99E+00	1.46E+00	2.10E+00	3.00E+00	9.56E+01	4.50E-01	3.13E-02	1.41E-02
C-14	3.09E+00	3.67E+00	3.34E+00	5.14E+00	2.52E+00	4.21E+00	3.27E+00	2.03E+00
Cl-36	9.92E-04	8.24E-04	9.09E-04	1.24E-03	2.40E-03	6.42E-04	1.00E-03	4.74E-04
Co-60	1.39E+05	1.82E+05	1.60E+05	2.56E+05	1.27E+05	2.00E+05	1.54E+05	9.73E+04
Ni-59	1.40E+01	1.99E+01	1.65E+01	2.62E+01	1.34E+01	2.41E+01	1.63E+01	1.16E+01
Ni-63	1.00E+03	1.45E+03	1.20E+03	1.92E+03	9.46E+02	1.75E+03	1.18E+03	8.42E+02
Sr-90	2.35E+02	8.60E+01	1.23E+02	1.77E+02	5.63E+03	2.65E+01	1.85E+00	8.31E-01
Nb-94	4.36E-01	6.52E-01	5.35E-01	8.55E-01	4.26E-01	7.98E-01	5.23E-01	3.81E-01
Tc-99	1.11E+00	1.60E+00	1.33E+00	2.13E+00	1.99E+00	1.92E+00	1.28E+00	9.19E-01
I-129	8.21E-05	3.00E-05	4.31E-05	6.17E-05	1.97E-03	9.25E-06	6.44E-07	2.90E-07
Cs-137	3.25E+02	1.19E+02	1.71E+02	2.45E+02	7.79E+03	3.67E+01	2.55E+00	1.15E+00
Eu-152	4.13E-02	1.51E-02	2.17E-02	3.11E-02	9.90E-01	4.66E-03	3.24E-04	1.46E-04
Eu-154	4.31E+00	1.58E+00	2.26E+00	3.24E+00	1.03E+02	4.86E-01	3.38E-02	1.52E-02
Pb-210	1.87E-09	6.85E-10	9.84E-10	1.41E-09	4.49E-08	2.11E-10	1.47E-11	6.62E-12
Ra-226	3.49E-08	1.17E-08	1.47E-08	9.35E-09	2.13E-07	3.94E-09	2.74E-10	1.24E-10
Ra-228	1.97E-11	6.53E-12	8.16E-12	4.63E-12	9.64E-11	2.22E-12	1.54E-13	6.96E-14
Ac-227	1.15E-06	4.22E-07	6.06E-07	8.68E-07	2.77E-05	1.30E-07	9.06E-09	4.08E-09
Th-228	8.49E-04	3.10E-04	4.46E-04	6.38E-04	2.03E-02	9.56E-05	6.66E-06	3.00E-06
Th-229	6.11E-09	2.23E-09	3.21E-09	4.59E-09	1.46E-07	6.88E-10	4.79E-11	2.16E-11
Th-230	1.60E-06	5.87E-07	8.43E-07	1.21E-06	3.84E-05	1.81E-07	1.26E-08	5.67E-09
Th-232	2.11E-05	7.72E-06	1.11E-05	1.59E-05	5.05E-04	2.38E-06	1.66E-07	7.46E-08
Pa-231	1.35E-06	4.96E-07	7.12E-07	1.02E-06	3.25E-05	1.53E-07	1.06E-08	4.79E-09
U-232	3.71E-05	1.36E-05	1.95E-05	2.79E-05	8.89E-04	4.18E-06	2.91E-07	1.31E-07
U-233	3.01E-06	1.10E-06	1.58E-06	2.26E-06	7.21E-05	3.39E-07	2.36E-08	1.06E-08
U-234	8.38E-02	2.12E-02	1.08E-01	4.33E-01	1.05E+00	1.75E-01	2.38E-02	8.76E-03
U-235	3.35E-03	7.95E-04	4.67E-03	1.93E-02	3.70E-02	7.85E-03	1.08E-03	3.95E-04
U-236	1.26E-03	4.62E-04	6.64E-04	9.51E-04	3.03E-02	1.42E-04	9.93E-06	4.47E-06
U-238	5.24E-02	2.21E-04	6.35E-03	4.81E-02	1.27E-02	4.82E-03	8.08E-05	1.76E-04
Np-237	2.62E-04	9.57E-05	1.37E-04	1.97E-04	6.27E-03	2.95E-05	2.05E-06	9.25E-07
Pu-238	2.03E-01	7.41E-02	1.06E-01	1.52E-01	4.85E+00	2.28E-02	1.59E-03	7.16E-04
Pu-239	5.39E+00	1.97E+00	2.83E+00	4.05E+00	1.29E+02	6.07E-01	4.23E-02	1.90E-02
Pu-240	4.12E-01	1.51E-01	2.17E-01	3.10E-01	9.88E+00	4.65E-02	3.24E-03	1.46E-03
Pu-241	3.55E+01	1.30E+01	1.86E+01	2.67E+01	8.50E+02	4.00E+00	2.78E-01	1.25E-01
Pu-242	1.13E-04	4.15E-05	5.96E-05	8.53E-05	2.72E-03	1.28E-05	8.90E-07	4.01E-07
Pu-244	7.50E-14	2.74E-14	3.94E-14	5.64E-14	1.80E-12	8.45E-15	5.89E-16	2.65E-16
Am-241	1.78E-01	6.50E-02	9.33E-02	1.34E-01	4.26E+00	2.00E-02	1.39E-03	6.28E-04
Am-243	4.80E-04	1.76E-04	2.52E-04	3.61E-04	1.15E-02	5.41E-05	3.77E-06	1.70E-06
Cm-243	1.37E-04	5.00E-05	7.18E-05	1.03E-04	3.28E-03	1.54E-05	1.07E-06	4.84E-07
Cm-244	8.68E-03	3.17E-03	4.56E-03	6.53E-03	2.08E-01	9.78E-04	6.81E-05	3.07E-05
Cm-245	2.13E-07	7.79E-08	1.12E-07	1.60E-07	5.10E-06	2.40E-08	1.67E-09	7.53E-10
Cm-246	1.99E-09	7.28E-10	1.05E-09	1.50E-09	4.77E-08	2.24E-10	1.56E-11	7.04E-12
Cm-247	7.17E-16	2.62E-16	3.77E-16	5.39E-16	1.72E-14	8.08E-17	5.63E-18	2.54E-18
Cm-248	6.66E-17	2.44E-17	3.50E-17	5.01E-17	1.60E-15	7.51E-18	5.23E-19	2.36E-19
Totals =	1.41E+05	1.84E+05	1.62E+05	2.59E+05	1.58E+05	2.02E+05	1.56E+05	9.82E+04

Table B-33 (Part 5). Upper-bound total inventory from all ANL-W waste streams (1960 through 1993).

Nuclide	1992 (Ci)	1993 (Ci)	Total
			1960-1993 (Ci)
H-3	5.31E-01	1.53E-02	7.01E+02
C-14	1.82E+00	1.69E+00	6.33E+01
Cl-36	4.81E-04	4.65E-04	2.72E-02
Co-60	7.85E+04	7.57E+04	3.09E+06
Ni-59	8.40E+00	7.85E+00	3.32E+02
Ni-63	6.01E+02	5.65E+02	2.40E+04
Sr-90	3.13E+01	8.99E-01	4.01E+04
Nb-94	2.63E-01	2.46E-01	1.08E+01
Tc-99	6.48E-01	6.06E-01	3.30E+01
I-129	1.09E-05	3.14E-07	1.40E-02
Cs-137	4.33E+01	1.24E+00	5.55E+04
Eu-152	5.50E-03	1.58E-04	7.05E+00
Eu-154	5.74E-01	1.65E-02	7.36E+02
Pb-210	2.49E-10	7.16E-12	3.20E-07
Ra-226	4.65E-09	1.34E-10	3.00E-01
Ra-228	2.62E-12	7.52E-14	2.09E-09
Ac-227	1.54E-07	4.41E-09	1.97E-04
Th-228	1.13E-04	3.24E-06	1.45E-01
Th-229	8.13E-10	2.33E-11	1.04E-06
Th-230	2.14E-07	6.14E-09	2.74E-04
Th-232	2.81E-06	8.07E-08	3.96E-03
Pa-231	1.80E-07	5.18E-09	2.31E-04
U-232	4.94E-06	1.42E-07	6.34E-03
U-233	4.01E-07	1.15E-08	5.14E-04
U-234	3.02E-02	4.61E-02	5.93E+00
U-235	1.31E-03	2.09E-03	1.93E-01
U-236	1.68E-04	4.83E-06	2.16E-01
U-238	5.73E-03	1.11E-04	2.09E+00
Np-237	3.48E-05	1.00E-06	5.12E-02
Pu-238	2.70E-02	7.75E-04	3.46E+01
Pu-239	7.17E-01	2.06E-02	9.97E+02
Pu-240	5.49E-02	1.58E-03	7.04E+01
Pu-241	4.72E+00	1.36E-01	6.06E+03
Pu-242	1.51E-05	4.34E-07	1.94E-02
Pu-244	9.99E-15	2.87E-16	1.28E-11
Am-241	2.37E-02	6.79E-04	3.03E+01
Am-243	6.40E-05	1.84E-06	8.20E-02
Cm-243	1.82E-05	5.23E-07	2.34E-02
Cm-244	1.16E-03	3.32E-05	1.48E+00
Cm-245	2.84E-08	8.14E-10	3.64E-05
Cm-246	2.65E-10	7.61E-12	3.40E-07
Cm-247	9.55E-17	2.74E-18	1.22E-13
Cm-248	8.87E-18	2.55E-19	1.14E-14
Totals =	7.92E+04	7.63E+04	3.24E+06

File = "NEW Upper-bound Totals.xls"

Table B-34. Total summary source term for 1960 through 1993.

Nuclide	Lower-bound 1960–1993 (Ci)	Best-Estimate 1960–1993 (Ci)	Upper-bound 1960–1993 (Ci)
H-3	3.61E+01	1.49E+02	7.01E+02
C-14	1.57E+01	3.15E+01	6.33E+01
Cl-36	3.94E-03	7.98E-03	2.72E-02
Co-60	7.72E+05	1.54E+06	3.09E+06
Ni-59	8.23E+01	1.65E+02	3.32E+02
Ni-63	6.01E+03	1.20E+04	2.40E+04
Sr-90	1.00E+04	2.01E+04	4.01E+04
Nb-94	2.69E+00	5.38E+00	1.08E+01
Tc-99	8.26E+00	1.65E+01	3.30E+01
I-129	3.50E-03	7.01E-03	1.40E-02
Cs-137	1.39E+04	2.78E+04	5.55E+04
Eu-152	2.82E-01	1.41E+00	7.05E+00
Eu-154	2.94E+01	1.47E+02	7.36E+02
Pb-210	3.20E-09	3.20E-08	3.20E-07
Ra-226	1.33E-01	2.00E-01	3.00E-01
Ra-228	9.69E-13	3.36E-11	2.09E-09
Ac-227	4.93E-07	9.85E-06	1.97E-04
Th-228	5.79E-05	2.90E-03	1.45E-01
Th-229	1.16E-07	3.47E-07	1.04E-06
Th-230	6.85E-05	1.37E-04	2.74E-04
Th-232	3.05E-04	9.62E-04	3.96E-03
Pa-231	9.25E-06	4.63E-05	2.31E-04
U-232	1.58E-03	3.17E-03	6.34E-03
U-233	1.28E-04	2.57E-04	5.14E-04
U-234	1.98E+00	3.39E+00	5.93E+00
U-235	1.14E-01	1.47E-01	1.93E-01
U-236	5.40E-02	1.08E-01	2.16E-01
U-238	9.23E-01	1.39E+00	2.09E+00
Np-237	1.41E-02	2.67E-02	5.12E-02
Pu-238	3.84E+00	1.15E+01	3.46E+01
Pu-239	2.64E+02	5.11E+02	9.97E+02
Pu-240	7.04E-01	7.04E+00	7.04E+01
Pu-241	2.42E+00	1.21E+02	6.06E+03
Pu-242	1.94E-04	1.94E-03	1.94E-02
Pu-244	1.28E-13	1.28E-12	1.28E-11
Am-241	3.03E-01	3.03E+00	3.03E+01
Am-243	3.28E-05	1.64E-03	8.20E-02
Cm-243	9.34E-06	4.67E-04	2.34E-02
Cm-244	1.48E-04	1.48E-02	1.48E+00
Cm-245	1.45E-08	7.27E-07	3.64E-05
Cm-246	1.36E-10	6.80E-09	3.40E-07
Cm-247	3.06E-16	6.12E-15	1.22E-13
Cm-248	1.14E-16	1.14E-15	1.14E-14
Totals =	8.02E+05	1.60E+06	3.24E+06

Table B-35. Activity distribution of radionuclides among the possible waste streams based on the best-estimate curie inventory.

Nuclide	MOD-1H (Ci)	MOD-2H (Ci)	MOD-2Hext (Ci)	MOD-3H (Ci)	MOD-4H (Ci)	MOD-5H (Ci)	MOD-1R (Ci)	MOD-2R (Ci)	MOD-3R (Ci)	MOD-4R (Ci)	Total (Ci)
H-3	0.00E+00	2.36E+01	1.97E+01	2.09E+01	1.33E+01	6.83E+01	0.00E+00	0.00E+00	3.22E+00	4.95E-01	1.49E+02
C-14	1.60E+01	1.61E-02	1.34E-02	1.42E-02	0.00E+00	4.65E-02	1.54E+01	0.00E+00	2.19E-03	3.37E-04	3.15E+01
Cl-36	4.05E-03	1.99E-05	1.65E-05	1.76E-05	0.00E+00	5.74E-05	3.82E-03	0.00E+00	2.70E-06	4.16E-07	7.98E-03
Co-60	8.09E+05	9.23E+01	7.68E+01	8.16E+01	0.00E+00	2.67E+02	7.35E+05	0.00E+00	1.26E+01	1.93E+00	1.54E+06
Ni-59	8.57E+01	4.83E-02	4.02E-02	4.27E-02	0.00E+00	1.39E-01	7.89E+01	0.00E+00	6.57E-03	1.01E-03	1.65E+02
Ni-63	6.27E+03	1.86E+00	1.55E+00	1.65E+00	0.00E+00	5.38E+00	5.73E+03	0.00E+00	2.53E-01	3.90E-02	1.20E+04
Sr-90	0.00E+00	3.48E+03	2.90E+03	3.08E+03	0.00E+00	1.01E+04	0.00E+00	0.00E+00	4.74E+02	7.30E+01	2.01E+04
Nb-94	2.81E+00	2.66E-03	2.21E-03	2.35E-03	0.00E+00	7.68E-03	2.55E+00	0.00E+00	3.61E-04	5.57E-05	5.38E+00
Tc-99	6.88E+00	5.89E-01	4.90E-01	5.21E-01	0.00E+00	1.70E+00	6.24E+00	0.00E+00	8.01E-02	1.23E-02	1.65E+01
I-129	0.00E+00	1.22E-03	1.01E-03	1.07E-03	0.00E+00	3.51E-03	0.00E+00	0.00E+00	1.65E-04	2.55E-05	7.01E-03
Cs-137	0.00E+00	4.82E+03	4.01E+03	4.26E+03	0.00E+00	1.39E+04	0.00E+00	0.00E+00	6.55E+02	1.01E+02	2.78E+04
Eu-152	0.00E+00	2.45E-01	2.04E-01	2.16E-01	0.00E+00	7.07E-01	0.00E+00	0.00E+00	3.33E-02	5.13E-03	1.41E+00
Eu-154	0.00E+00	2.55E+01	2.12E+01	2.26E+01	0.00E+00	7.38E+01	0.00E+00	0.00E+00	3.47E+00	5.35E-01	1.47E+02
Pb-210	0.00E+00	5.55E-09	4.62E-09	4.90E-09	0.00E+00	1.60E-08	0.00E+00	0.00E+00	7.55E-10	1.16E-10	3.20E-08
Ra-226	0.00E+00	5.18E-08	4.31E-08	4.58E-08	2.00E-01	1.50E-07	0.00E+00	0.00E+00	7.04E-09	1.08E-09	2.00E-01
Ra-228	0.00E+00	5.83E-12	4.85E-12	5.15E-12	0.00E+00	1.68E-11	0.00E+00	0.00E+00	7.93E-13	1.22E-13	3.36E-11
Ac-227	0.00E+00	1.71E-06	1.42E-06	1.51E-06	0.00E+00	4.94E-06	0.00E+00	0.00E+00	2.33E-07	3.58E-08	9.85E-06
Th-228	0.00E+00	5.03E-04	4.18E-04	4.44E-04	0.00E+00	1.45E-03	0.00E+00	0.00E+00	6.84E-05	1.05E-05	2.90E-03
Th-229	0.00E+00	6.03E-08	5.02E-08	5.33E-08	0.00E+00	1.74E-07	0.00E+00	0.00E+00	8.20E-09	1.26E-09	3.47E-07
Th-230	0.00E+00	2.38E-05	1.98E-05	2.10E-05	0.00E+00	6.87E-05	0.00E+00	0.00E+00	3.23E-06	4.98E-07	1.37E-04
Th-232	0.00E+00	1.25E-04	1.04E-04	1.11E-04	2.42E-04	3.61E-04	0.00E+00	0.00E+00	1.70E-05	2.62E-06	9.62E-04
Pa-231	0.00E+00	8.03E-06	6.68E-06	7.10E-06	0.00E+00	2.32E-05	0.00E+00	0.00E+00	1.09E-06	1.68E-07	4.63E-05

Table B-35 (Part 2). Activity distribution of radionuclides among the possible waste streams based on the best-estimate curie inventory.

Nuclide	MOD-1H (Ci)	MOD-2H (Ci)	MOD-2Hext (Ci)	MOD-3H (Ci)	MOD-4H (Ci)	MOD-5H (Ci)	MOD-1R (Ci)	MOD-2R (Ci)	MOD-3R (Ci)	MOD-4R (Ci)	Total (Ci)
U-232	0.00E+00	5.50E-04	4.58E-04	4.86E-04	0.00E+00	1.59E-03	0.00E+00	0.00E+00	7.48E-05	1.15E-05	3.17E-03
U-233	0.00E+00	4.46E-05	3.71E-05	3.94E-05	0.00E+00	1.29E-04	0.00E+00	0.00E+00	6.06E-06	9.34E-07	2.57E-04
U-234	0.00E+00	2.91E-01	2.42E-01	2.57E-01	7.48E-01	8.40E-01	0.00E+00	9.71E-01	3.96E-02	6.09E-03	3.39E+00
U-235	0.00E+00	1.19E-02	9.87E-03	1.05E-02	3.42E-02	3.43E-02	0.00E+00	4.40E-02	1.61E-03	2.49E-04	1.47E-01
U-236	0.00E+00	1.87E-02	1.56E-02	1.66E-02	0.00E+00	5.41E-02	0.00E+00	0.00E+00	2.55E-03	3.92E-04	1.08E-01
U-238	0.00E+00	2.28E-03	1.90E-03	2.01E-03	1.29E+00	6.58E-03	0.00E+00	8.44E-02	3.10E-04	4.77E-05	1.39E+00
Np-237	0.00E+00	3.88E-03	3.23E-03	3.43E-03	4.37E-03	1.12E-02	0.00E+00	0.00E+00	5.27E-04	8.12E-05	2.67E-02
Pu-238	0.00E+00	2.00E+00	1.66E+00	1.77E+00	0.00E+00	5.78E+00	0.00E+00	0.00E+00	2.72E-01	4.19E-02	1.15E+01
Pu-239	0.00E+00	7.98E+01	6.64E+01	7.06E+01	5.15E+01	2.31E+02	0.00E+00	0.00E+00	1.09E+01	1.67E+00	5.11E+02
Pu-240	0.00E+00	1.22E+00	1.02E+00	1.08E+00	0.00E+00	3.53E+00	0.00E+00	0.00E+00	1.66E-01	2.56E-02	7.04E+00
Pu-241	0.00E+00	2.10E+01	1.75E+01	1.86E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	2.86E+00	4.40E-01	1.21E+02
Pu-242	0.00E+00	3.36E-04	2.80E-04	2.97E-04	0.00E+00	9.71E-04	0.00E+00	0.00E+00	4.57E-05	7.04E-06	1.94E-03
Pu-244	0.00E+00	2.22E-13	1.85E-13	1.96E-13	0.00E+00	6.42E-13	0.00E+00	0.00E+00	3.02E-14	4.66E-15	1.28E-12
Am-241	0.00E+00	5.27E-01	4.38E-01	4.65E-01	0.00E+00	1.52E+00	0.00E+00	0.00E+00	7.16E-02	1.10E-02	3.03E+00
Am-243	0.00E+00	2.85E-04	2.37E-04	2.52E-04	0.00E+00	8.22E-04	0.00E+00	0.00E+00	3.87E-05	5.96E-06	1.64E-03
Cm-243	0.00E+00	8.11E-05	6.74E-05	7.16E-05	0.00E+00	2.34E-04	0.00E+00	0.00E+00	1.10E-05	1.70E-06	4.67E-04
Cm-244	0.00E+00	2.57E-03	2.14E-03	2.27E-03	0.00E+00	7.43E-03	0.00E+00	0.00E+00	3.50E-04	5.39E-05	1.48E-02
Cm-245	0.00E+00	1.26E-07	1.05E-07	1.12E-07	0.00E+00	3.65E-07	0.00E+00	0.00E+00	1.72E-08	2.64E-09	7.27E-07
Cm-246	0.00E+00	1.18E-09	9.82E-10	1.04E-09	0.00E+00	3.41E-09	0.00E+00	0.00E+00	1.61E-10	2.47E-11	6.80E-09
Cm-247	0.00E+00	1.06E-15	8.84E-16	9.39E-16	0.00E+00	3.07E-15	0.00E+00	0.00E+00	1.45E-16	2.23E-17	6.12E-15
Cm-248	0.00E+00	1.97E-16	1.64E-16	1.74E-16	0.00E+00	5.70E-16	0.00E+00	0.00E+00	2.69E-17	4.14E-18	1.14E-15
Totals=	8.15E+05	8.55E+03	7.11E+03	7.56E+03	6.71E+01	2.47E+04	7.41E+05	1.10E+00	1.16E+03	1.79E+02	1.60E+06

Table B-36. Relative distribution of radionuclides among the possible waste streams based on the best-estimate curie inventory.

Nuclide	MOD-1H	MOD-2H	MOD-2Hext	MOD-3H	MOD-4H	MOD-5H	MOD-1R	MOD-2R	MOD-3R	MOD-4R	Total	
H-3	0.00%	15.81%	13.16%	13.97%	8.90%	45.68%	0.00%	0.00%	2.15%	0.33%	100.00%	
C-14	50.95%	0.05%	0.04%	0.05%	0.00%	0.15%	48.76%	0.00%	0.01%	0.00%	100.00%	
Cl-36	50.78%	0.25%	0.21%	0.22%	0.00%	0.72%	47.78%	0.00%	0.03%	0.01%	100.00%	
Co-60	52.37%	0.01%	0.00%	0.01%	0.00%	0.02%	47.59%	0.00%	0.00%	0.00%	100.00%	
Ni-59	51.98%	0.03%	0.02%	0.03%	0.00%	0.08%	47.85%	0.00%	0.00%	0.00%	100.00%	
Ni-63	52.22%	0.02%	0.01%	0.01%	0.00%	0.04%	47.69%	0.00%	0.00%	0.00%	100.00%	
Sr-90	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Nb-94	52.26%	0.05%	0.04%	0.04%	0.00%	0.14%	47.45%	0.00%	0.01%	0.00%	100.00%	
Tc-99	41.68%	3.57%	2.97%	3.15%	0.00%	10.30%	37.77%	0.00%	0.49%	0.07%	100.00%	
I-129	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Cs-137	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
B-89	Eu-152	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Eu-154	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Pb-210	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Ra-226	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	
Ra-228	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Ac-227	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Th-228	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Th-229	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Th-230	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	
Th-232	0.00%	12.99%	10.81%	11.48%	25.15%	37.52%	0.00%	0.00%	1.77%	0.27%	100.00%	
Pa-231	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%	

Table B-36 (Part 2). Relative distribution of radionuclides among the possible waste streams based on the best-estimate curie inventory.

Nuclide	MOD-1H	MOD-2H	MOD-2Hext	MOD-3H	MOD-4H	MOD-5H	MOD-1R	MOD-2R	MOD-3R	MOD-4R	Total
U-232	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
U-233	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
U-234	0.00%	8.57%	7.13%	7.57%	22.04%	24.75%	0.00%	28.60%	1.17%	0.18%	100.00%
U-235	0.00%	8.10%	6.73%	7.15%	23.36%	23.39%	0.00%	30.00%	1.10%	0.17%	100.00%
U-236	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
U-238	0.00%	0.16%	0.14%	0.15%	92.97%	0.47%	0.00%	6.08%	0.02%	0.00%	100.00%
Np-237	0.00%	14.52%	12.08%	12.83%	16.36%	41.93%	0.00%	0.00%	1.97%	0.30%	100.00%
Pu-238	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Pu-239	0.00%	15.61%	12.99%	13.79%	10.08%	45.08%	0.00%	0.00%	2.12%	0.33%	100.00%
Pu-240	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Pu-241	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Pu-242	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Pu-244	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Am-241	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Am-243	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Cm-243	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Cm-244	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Cm-245	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Cm-246	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Cm-247	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
Cm-248	0.00%	17.36%	14.44%	15.34%	0.00%	50.14%	0.00%	0.00%	2.36%	0.36%	100.00%
All nuclides	50.78%	0.53%	0.44%	0.47%	0.00%	1.54%	46.15%	0.00%	0.07%	0.01%	100.00%

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B-8. REFERENCES

- Bunde, K. A., 1997, Intra-Laboratory memo to D. C. Curforth and R. W. Schaefer, "Report of work in Support of LMITCO PO No. K97-177678," August 27, 1997.
- Croff, A. G., 1980, *ORIGEN2—A Revised and Updated Version of the Oak Ridge Isotope Generation and Depletion Code*, ORNL-5621, Oak Ridge National Laboratory.
- DOE, 2000, "Final Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel," DOE/EIS-0306 Volume 2, July 2000, Table B-4 (page B-5).
- Kuan, P., 2003, *Evaluation of Radionuclide Contents in RH TRU Waste Drums 728-737 Based on Reported Irradiated Fuel Examination*, INEEL/EXT-02-00168, Rev. 0, September 2003.
- Kuan, P., and Khericha, S. T., 2002, "Results of ORIGEN2 Calculations for 14 EBR-II Experiment Fuel Elements that Generated Remote-Handled TRU Waste in Drums 728-737," EDF-2365, September 2002.
- Liaw, J. R., 1998, "Characteristics of DOE Sodium-Bonded Spent Nuclear Fuel Inventory," ANL Intra-Laboratory Memo to J.R. W. Benedict, February 24, 1998.
- LMITCO, 1995a, *A Comprehensive inventory of Radiological and Nonradiological Contaminants in Waste Buried in the Subsurface Disposal Area of the INEL RWMC During the Years 1952-1983*, INEL-95/0310, Rev. 1, Idaho National Engineering and Environmental Laboratory.
- LMITCO, 1995b, *A Comprehensive inventory of Radiological and Nonradiological Contaminants in Waste Buried in the Subsurface Disposal Area of the INEL RWMC During the Years 1984-1995*, INEL-95/0135, Rev. 1, Idaho National Engineering and Environmental Laboratory.